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Appendix A
Secretary's Certificate on Airside Improvements Planning Project Final EIR

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June 15, 2001

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE FINAL ENVIRONMENTAL IMPACT REPORT

PROJECT NAME	: Logan Airside Improvements Planning Project
PROJECT MUNICIPALITY	: Boston/Winthrop
PROJECT WATERSHED	: Boston Harbor
EOEA NUMBER	: 10458
PROJECT PROPONENT	: Massachusetts Port Authority (Massport)
DATE NOTICED IN MONITOR	: May 9, 2001

The Secretary of Environmental Affairs hereby determines that the Final Environmental Impact Report (FEIR) submitted on this project adequately and properly complies with the Massachusetts Environmental Policy Act (MEPA)(M.G.L. c. 30, ss. 61-62H) and with its implementing regulations (301 C.M.R. 11.00). This concludes the MEPA review of this project.

PROJECT DESCRIPTION

As described in the FEIR, the proponent's preferred alternative, Alternative 1A, includes four project elements: a 5,000 foot unidirectional runway (Runway 14/32); a 9,300 foot taxiway between Runways 4L/22R and 4R/22L (the Centerfield Taxiway); other taxiway improvements; and reduction of runway approach minima on Runways 15R, 22L, 27, and 33L. The FEIR also evaluates implementation of Peak Period Pricing (PPP), both as part of Alternative 1, which include all project elements, and as part of Alternative 2, which excludes Runway 14/32. Although the document does not include this measure as part of the preferred alternative, the FEIR makes a tentative commitment to implement PPP at an unspecified time in the future.

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Each of the alternatives was studied for its potential delay benefits and environmental impacts at different projected future annual passenger levels of 29 million and 37.5 million. Each level was studied for a "high fleet" with relatively more operations and a "low fleet" with fewer operations. The 37.5 million passenger scenario also includes a fleet mix with a relatively high percentage of regional jets (RJs), yielding a total number of operations in-between the high and low fleets.

REVIEW PROCESS AND APPROVAL STANDARDS

Under Section 11.08(2) of the MEPA Regulations, during the course of an EIR review I may review any relevant information from any other source to determine whether the EIR is adequate. The proposed project (and especially Runway 14/32) has generated an enormous volume of public comments at both the DEIR and FEIR stage, including oral statements heard at the joint FAA/MEPA meeting in April, hundreds of letters, and thousands of form letters and emails. My staff has met with project supporters and critics, including Massport and its consultants, the FAA, members of the FAA-appointed Panel, the Citizens Advisory Committee (CAC), the "South Shore Coalition" (including the municipalities of Cohasset, Everett, Hingham, Hull, Somerville, and Winthrop), the Greater Boston Chamber of Commerce, and the City of Boston. Because many issues raised relate to airport-wide operations and impacts, I have also referred to documents from the Environmental Status and Planning Report (ESPR) process, EOEA #3247/5146.

MEPA review is an informal process, which does not itself result in any formal adjudicative decision approving or disapproving a project. Section 11.08(8) of the MEPA Regulations requires me to find a FEIR adequate even if certain aspects of the project or issues require additional analysis of technical issues, so long as I find that "the aspects and issues have been clearly described and their nature and general elements analyzed in the EIR or during MEPA review, that the aspects and issues can be fully analyzed prior to any Agency issuing its Section 61 Findings, and that there will be meaningful opportunities for public review of the additional analysis prior to any Agency taking Agency Action on the Project." As described in more detail in this Certificate, after examining the record before me, I find that there is enough information on alternatives, impacts, and mitigation to meet that standard.

Prior to project commencement, Massport must prepare and adopt a Section 61 Finding pursuant to MEPA, which details all of the agency's enforceable commitments to actions that will avoid, minimize, or mitigate the project's environmental impacts. The project will also require a Conservation Permit from the Department of Fisheries, Wildlife, and Environmental Law Enforcement, pursuant to the Massachusetts Endangered Species Act.

The Federal Aviation Administration (FAA) is reviewing the project as a Supplemental Draft Environmental Impact Statement (SDEIS) under the National Environmental Policy Act (NEPA). This certificate applies to the review of the project under MEPA only, and does not restrict the ability of the federal government to act on those aspects of the project subject to NEPA. The

FAA as the federal proponent must still prepare a Final EIS pursuant to NEPA, and ultimately a Record of Decision following review of the EIS. Should there be any material change to the project (including its mitigation measures) arising out of the federal process, a Notice of Project Change would be filed for public review and comment, and the Section 61 Finding amended, if necessary.

SUMMARY OF KEY FINDINGS

Purpose and Need. Since the Airside Project initiated MEPA review in 1995 there has been a rapid increase in the use of regional jets (RJs), which now account for 16% to 19% of the Logan fleet. Massport has responded in the FEIR to this development by including a "high-RJ" scenario in its analysis of the 37.5 million annual passenger condition. If, as some commenters argue, RJ use has been overestimated, the resulting environmental impacts of the project will also be less, more closely approaching the no-build condition than the build condition. In other words, the FEIR analysis may credibly be viewed as providing a conservative "worst-case" analysis for the purposes of environmental impact review.

Alternatives Analysis and Peak Period Pricing. The preferred alternative identified in the FEIR, 1A, includes all project elements except Peak Period Pricing (PPP). Many of the substantive critical comments I have received argue that the preferred alternative should be Alternative 2, which includes PPP and excludes Runway 14/32. After examining the FEIR and the comments, I find that at all levels of growth the project alternative with the greatest benefits and least negative impacts is Alternative 1, which includes both Runway 14/32 and Peak Period Pricing (PPP). Attachment A on the following page summarizes this analysis.

PPP is worth $49 million a year to the regional economy in reduced delays. More importantly, because PPP will reduce both noise and air pollution impacts on the most immediately affected communities, it fulfills the principal statutory goal of MEPA. The proposed PPP program contains a tightly crafted exemption for Cape Cod, the Islands, and other smaller New England communities, to ensure that they do not lose access to the national air network. Massport needs to commit to putting in place as a project element an enforceable PPP program (or an alternative demand management program with comparable effectiveness). Setting out clear rules well in advance will allow airlines to predict with certainty the costs of their scheduling decisions, and modify their behavior accordingly.

Segmentation and Induced Demand. The FEIR contends that the preferred alternative is intended solely to alleviate delays (particularly during northwest winds) and maximize operational efficiency as passenger levels increase. In other words, the airside projects will accommodate existing and projected demand, not generate additional demand. On the other hand, many commenters clearly see the preferred alternative as an expansion of Logan Airport, and their comments focus on the cumulative impacts of airport-wide operations.

The FAA panel process gave rise to the new suggestion that use of Runway 14/32 should be restricted to northwest wind conditions. The FEIR analysis indicates that although much of the runway's delay benefits could be retained, the environmental benefits of compliance with PRAS goals would be significantly less. Also, this concept lacks support in the public comments. Based on the current lack of information and questions over the effectiveness of this measure, I cannot support it at this time.

It appears that some undefined portion of the projected future increases in air traffic at Logan may well be induced by this project's enhancement of airport capacity. However, none of the project's opponents have brought forward any method for determining what portion of overall airport operations might be attributable to the Airside project, and I must therefore presume that no such method exists. The Airside project is not the forum for analyzing and mitigating the cumulative impacts of all airport-wide operations; this issue is more properly addressed in the ESPR.

The central environmental question before me, therefore, is not whether this project is accommodating or generating demand per se, but rather whether Massport is operating the airport in a manner that avoids, minimizes, and mitigates environmental impacts in light of its obligations under MEPA. In this certificate I have identified those principal measures identified in the FEIR and/or the ESPR – in particular, the NOx cap, noise mitigation, revamping of the PRAS goals, regionalization, and TMA participation – which, taken together, give me confidence that Massport is able to meet its Section 61 obligations.

Air Quality and the NOx Cap. Logan Airport currently ranks as the sixth largest source of NO_x emissions in the Commonwealth, and by 2015 it will become one of the three largest such sources. As passenger levels rise in the future, airport-wide NOx emissions are also projected to rise (unlike overall noise impacts, which will continue to shrink in the long-term). In response, Massport has committed itself to the Air Quality Initiative (AQI): a first-in-the-nation cap on net smog precursors (NOx and VOCs) at or below year 1999 levels, regardless of any future increases in passengers or operations. Without this cap, NOx was projected to increase from 2,444 tons/year in 1999 to 3,150 tons/year by 2015. The costs of the program will be passed through to the airlines, on the "polluter pays" principle.

Noise Impacts. A major benefit of the project, according to the FEIR, is greater compliance with the Preferential Runway Advisory System (PRAS) goals, which are aimed at ensuring a more equitable regional distribution of aircraft noise among all affected communities. Although the broad goals of PRAS are uncontroversial, the CAC's withdrawal of support for the current system shows that a revamping is necessary. Therefore, Massport needs to commit to begin working with the CAC to update the PRAS program, as part of its Section 61 Finding, with the proviso that the current system will remain effective until superseded. Massport will also continue to implement and extend its residential soundproofing program, to ensure full access for all residents who are entitled to its benefits (and regardless of whether federal funds are

available).

Centerfield Taxiway: To address neighborhood concerns over localized air pollution, odors, and noise, Massport will develop a program designed to maximize the use of single engine taxi procedures by all of its tenant airlines. In addition, Massport shall conduct follow-up air quality monitoring in neighborhoods surrounding the airport and under the flight path of Logan Airport, in consultation with DEP and DPH. This information will provide valuable baseline data for future studies.

Regionalization. Any long-term strategy to contain Logan's impacts requires the successful diversion of travel to other regional airports and rail travel. The FEIR shows that Logan's catchment area is shrinking, and most growth in regional air traffic is taking place at the rapidly growing Providence (T.F. Green) and Manchester airports. Amtrak's new Acela service, launched in December 2000, is projected to divert 1.2 million passengers a year, about one-third of the total New York-Boston market. Based on these trends, the FEIR suggests that future passenger levels at Logan are not likely to attain the projected level of 37.5 million until 2015 (as opposed to the DEIR estimates of 37.5 to 45 million annual passengers by the year 2010). Additional measures are likely to emerge from the recently launched New England Airports System Study. Massport should commit to making all of its Logan Express satellite parking lots and stations available for third-party bus and park'n'ride connections to other regional airports, including Manchester and Providence.

Ground Transportation: Completion of the MBTA's Blue Line modernization, Silver Line, and Urban Ring projects promises to bring the greatest improvements in future transit access to Logan. For its part, Massport will require all Logan employers to join the Airport Transportation Management Association (TMA) at the earliest possible opportunity, and to report in the ESPR on affirmative actions (such as T pass subsidies or other financial support) and HOV mode shares.

PROJECT PURPOSE AND NEED

According to the FEIR, in year 2000 Logan ranked 12th in total operations nationwide, but 6th in total delays and 2nd in arrival delays. The Final EIR has provided further information on the delay modeling, as a response to a number of substantive comments. The Final EIR has also clarified the base case year used in the delay analysis (and other areas, such as noise and air emissions). The FEIR presents several different methods of calculating delays. All of the methods yield the result that Logan is among the most delay-prone airports in the country (although the methods differ with respect to the absolute magnitude of the delay problem). It is clear that northwest wind conditions are responsible for about one-third of the current delay problem.

Since the Airside Project initiated MEPA review in 1995 there has been a rapid increase in the

use of regional jets (RJs), which now account for 16% to 19% of the Logan fleet. Massport has responded in the FEIR to this development by including a "high-RJ" scenario in its analysis of the 37.5 million annual passenger condition. The CAC and other commenters have argued in detail that most of the RJs in the projected future fleet will not use Runway 14/32 because their pilots will be unwilling to land on a 5,000-foot runway. Massport maintains that the FEIR has made appropriate assumptions regarding RJ use, using a sensitivity analysis derived from information in Appendix C. The Air Transport Association has commented in support of Massport's position.

From a transportation planning perspective, the use of Runway 14/32 by RJs has obvious implications for the purpose and need of the project. My role, however, is to review the potential environmental impacts of the project. If RJ use has been overestimated, the resulting environmental impacts of the project will also be less, more closely approaching the no-build condition than the build condition. In other words, the FEIR analysis may credibly be viewed as providing a conservative "worst-case" analysis for the purposes of environmental impact review. Based on the foregoing, I find that issues of purpose and need have been adequately addressed for the purposes of MEPA review.

ALTERNATIVES ANALYSIS AND PEAK PERIOD PRICING

As noted above, the alternatives analysis in the EIR has studied various combinations of project elements. The preferred alternative identified in the FEIR, 1A, includes all project elements except Peak Period Pricing (PPP). Many of the substantive critical comments I have received argue that the preferred alternative should be Alternative 2, which includes PPP and excludes Runway 14/32.

As described in the FEIR, PPP is a demand management tool that reduces airport delays by ensuring that demand does not exceed capacity. The FEIR analysis presumes the imposition of a flat landing fee surcharge, irrespective of aircraft weight, for times when airline scheduling exceeds 110 operations/hour (92% of the maximum capacity of 120 operations/hour) during peak hours (such as 2 PM to 8 PM). This financial disincentive can reduce delays by modifying airline scheduling behavior. By reducing taxiway delays, PPP is also projected to reduce air pollution and noise, and improve compliance with the PRAS noise distribution goals.

Alternatives analysis is at the core of MEPA review. Under the MEPA Regulations, an EIR must examine the negative and positive impacts of "all feasible alternatives." Section 11.07(6)(f, h). At the end of the review process, the proponent's Section 61 Finding must show, in its selection of a preferred alternative, that it has taken all feasible measures to avoid or minimize environmental impacts. Sections 11.07(6)(k), 11.12(5).

After examining the FEIR and the comments, I find that the project alternative that best meets this test is Alternative 1, which includes both Runway 14/32 and Peak Period Pricing. The EIR

analysis shows that under slower growth scenarios (37.5 million passengers, low fleet), Alternative 1A (Runway 14/32) yields greater delay benefits, with a smaller benefit accruing to PPP. As annual operations increase further (37.5 million, high fleet, and 45 million), implementing PPP alone (Alternative 2) leads to greater delay reduction benefits equaling or exceeding those of Runway 14/32. Most importantly, the DEIR and FEIR analysis shows that at all levels of growth, the combination of Runway 14/32 and PPP (Alternative 1) produces the greatest delay benefits and the least environmental impacts. Attachment A, attached to this certificate, summarizes the relative delay benefits, noise distribution benefits, noise impacts, and air quality impacts of Alternatives 1, 1A, and 2, compared with the no-build base case (Alternative 4).

The FEIR gives two reasons why PPP is not part of the preferred alternative: first, that it would impose economic costs on regional carriers and small communities, and second, that overscheduling does not currently exist at Logan.

The rebuttal to the first argument is contained in the FEIR document itself. In response to comments on the DEIR and my certificate, the FEIR re-analyzes the delay effects of a PPP program that contains a tightly crafted exemption for Cape Cod, the Islands, and other smaller New England communities, to ensure that they do not lose access to the national air network. The analysis shows that the delay reduction benefits of PPP are reduced somewhat in the high-RJ scenario, but still substantial. In purely economic terms, the additional 44,000 hours of delay eliminated by PPP are worth $49 million a year to the regional economy, by Massport and FAA's own calculations.[1] More importantly, because PPP will reduce both noise and air pollution impacts on the most immediately affected communities, it fulfills the principal statutory goal of MEPA.

I also do not find compelling the contention that PPP need not be implemented until later because overscheduling does not currently exist at Logan. The DEIR shows a real, if small, delay benefit from PPP even at the lowest level of increases in operations, the 29 million – low fleet scenario. Although the FEIR recognizes that PPP will become necessary at a future date, it offers limited detail on the proposed PPP monitoring system, or the trigger mechanism for implementing the program. I am concerned that the proposed arrangement may lead to a PPP program that is implemented too late and under conditions too uncertain to avoid unnecessary delays and unnecessary impacts.

Therefore, in its Section 61 Finding, Massport needs to commit to putting in place as a project element an enforceable PPP program (or an alternative demand management program with comparable effectiveness). Setting out clear rules well in advance will allow airlines to predict with certainty the costs of their scheduling decisions, and modify their behavior accordingly. Based on the foregoing, I find that issues of project alternatives have been adequately addressed for the purposes of MEPA review.

1 Each hour of delay is calculated to cost $1,115. FEIR, Section 1.6.

SEGMENTATION AND INDUCED DEMAND

The FEIR contends that the preferred alternative is intended solely to alleviate delays (particularly during northwest winds) and maximize operational efficiency as passenger levels increase. In other words, the airside projects will accommodate existing and projected demand, not generate additional demand. On the other hand, many commenters clearly see the preferred alternative as an expansion of Logan Airport, and their comments focus on the cumulative impacts of airport-wide operations. In the context of MEPA review, this raises two separate, but related questions: First, does this EIR represent an improper segmentation of MEPA review? And second, is the Airside project capacity neutral, or will it induce demand for additional airport use, which will in turn cause increased levels of environmental impacts?

Project segmentation and the ESPR

I have received numerous comments suggesting that the review of the airside projects has been improperly segmented under MEPA (and NEPA) from the review of airport operations as a whole. As stated in past certificates, the Environmental Status and Planning Report (ESPR) (formerly the Generic EIR, EOEA #3247/5146) provides a "big picture" cumulative analysis of Logan operations, impacts, and mitigation. It complements the project-specific EIR for the airside projects, helps to focus the review process of individual EIRs, and ensures that segmented project review does not occur in the context of MEPA review at Logan Airport. (Because the federal review process does not include the formal equivalent of the ESPR, my comments regarding segmentation are necessarily limited to the state review process.)

As I did in the DEIR certificate, I have treated comments received in this review as potentially applicable to the ESPR, as well as to the Airside EIR, and I have given specific instructions to Massport on issues that must be addressed in the next ESPR filing, including more detailed information on TMA participation, and more detailed monitoring of localized air quality impacts. I have also made reference to measures initially developed within the ESPR – notably, the Air Quality Initiative discussed below – as evidence that Massport is able to meet its Section 61 obligations.

Capacity neutrality

In determining Massport's obligation to avoid or minimize and mitigate environmental impacts, one must determine what the impacts fairly attributable to this project are. There is no precise answer to this question. As I have previously stated, I am not convinced that any alternative containing Runway 14/32 is purely a capacity neutral airfield enhancement, as the FEIR contends.

The FEIR concludes unequivocally that the Airside project will not increase Logan's capacity.

This conclusion is also stated in the FAA's recent benchmark study of major U.S. airports. It is clear that long-term increase in air passengers and operations are driven at least in part by national and regional market forces, independent of local conditions. Since the 1970s the total numbers of passengers and operations at Logan have more than doubled -- without the benefit of any additional runway capacity. It is impossible to determine with any precision whether this trend will continue unabated into the future, as Massport and the FAA contend, or whether the airport is nearing saturation in its current condition, as project opponents contend.

However, although the maximum "capacity" of the airport will remain at approximately 120 operations/hour with or without the airside improvements, the construction of Runway 14/32 will allow Logan to operate at or near 120 operations/hour for a greater proportion of the year than it currently does, by providing an additional high-capacity runway configuration that currently does not exist. The CAC's comment letter analyzes the projected increase on an annual basis, using a weighted average of different wind conditions. It concludes that Runway 14/32 will increase the airport's average capacity from 93 operations/hour to 110.

Moreover, if delays represent a problem as critical as those presented in the FEIR, there may well be some latent demand generated by the airside project. I have received numerous comment letters from local businesses favoring the project, who contend that current delays are hurting their business by making air travel to Boston less attractive. Clearly, these commenters believe that the airside improvements will serve a currently unsatisfied demand.

The FAA panel process gave rise to the new suggestion that if use of Runway 14/32 were restricted to northwest wind conditions, there would be little or no increase in airport capacity. The FEIR analysis of this proposal indicates that although much of the delay benefits of the runway could be retained, the environmental benefits of compliance with PRAS goals would be significantly less. (Other environmental impacts were not studied.) I also note that the concept lacks support in the public comments; neither the City of Boston, nor the CAC, nor the South Shore Coalition, have endorsed the concept. Based on the current lack of information and questions over the effectiveness of this measure, I cannot support it at this time.

In conclusion, it appears that some undefined portion of the projected future increases in air traffic at Logan may well be induced by this project's enhancement of airport capacity. However, none of the project's opponents have brought forward any method for determining what portion of overall airport operations might be attributable to the Airside project, and I must therefore presume that no such method exists. The Airside project is not the forum for analyzing and mitigating the cumulative impacts of <u>all</u> airport-wide operations; these impacts are more properly addressed in the ESPR. This approach is consistent with my DEIR certificate, and the instructions I gave for preparation of the FEIR.

The central environmental question before me, therefore, is not whether this project is accommodating or generating demand per se, but rather whether Massport is operating the airport

in a manner that avoids, minimizes, and mitigates environmental impacts in light of its obligations under MEPA. In this certificate I have identified those principal measures identified in the FEIR and/or the ESPR – in particular, the NOx cap, noise mitigation, revamping of the PRAS goals, regionalization, and TMA participation – which, taken together, give me confidence that Massport is able to meet its Section 61 obligations.

Based on the foregoing, I find that issues of segmentation and induced demand have been adequately addressed for purposes of MEPA review.

AIR QUALITY AND THE NOx CAP

The air pollution impacts of operations at Logan Airport are both invisible and silent. These impacts have received far less attention in the public comments than noise. Nevertheless, I am extremely concerned over this issue.

The FEIR analysis shows that, due to greater operating efficiencies, each of the project alternatives produce air quality benefits, compared with the no-build case. At the same time, as passenger levels rise in the future, airport-wide NOx emissions are also projected to rise (unlike overall noise impacts, which will continue to shrink in the long-term). Aircraft emissions are the only mobile air pollution sources included in the State Implementation Plan (SIP) emissions inventory that are not slated for meaningful near- or long-term emissions reductions. Logan Airport currently ranks as the sixth largest source of NO_x emissions in the Commonwealth. With Governor Swift's recent imposition of new regulations on existing power plants (the so-called "filthy five"), by 2015 Logan will become one of the three largest such sources.

For these reasons, in the DEIR certificate I required Massport to use the ESPR process to examine the feasibility of a market-based, revenue-neutral program to control air pollution. In response, Massport has voluntarily committed itself to the Air Quality Initiative (AQI), developed through the ESPR and described in a report that was noticed in the *Environmental Monitor* on April 11, 2001. I want to commend Massport and its Executive Director, Virginia Buckingham, for taking this step. The AQI constitutes a first-in-the-nation airport cap on net smog precursors (NOx and VOCs) at or below year 1999 levels, regardless of any future increases in passengers or operations. Without this cap, NOx was projected to rise from 2,444 tons/year in 1999 to 3,150 tons/year by 2015.

About one-third of the necessary reductions will occur on-airport, chiefly through the conversion of ground service equipment to clean fuels. The balance will be obtained off-site, funded by Massport and carried out through an enforceable system of emissions credits. The system will reward air quality improvements in the most affected neighboring communities, favoring mobile sources (such as trash haulers and school bus fleets). The costs of the program will not be borne by the taxpayers, but will be passed through to the airlines, on the "polluter pays" principle.

Massport has agreed to work with EOEA, through the ESPR process, to determine how best to structure an effective and enforceable AQI that will ensure the avoidance of air pollution impacts. I expect Massport to solicit project submissions from local governments and community groups, which will be reviewed in an objective, science-based process by a neutral organization such as NESCAUM. Based on the foregoing, I find that issues of air quality impacts have been adequately addressed for purposes of MEPA review.

NOISE

The FEIR includes a detailed assessment of the noise impacts of the proposed Runway 14/32 and the other airside elements. The net result of Massport's preferred alternative is to reduce the number of people modeled to be exposed to the highest (>70 dB DNL) levels of noise. At the same time, as a result of greater compliance with the PRAS goals (see below), the project is projected to produce a relatively small increase in the number of people exposed to noise in the 65-70 dB DNL range, and a somewhat larger increase in the 60-65 dB DNL range, in each case compared with the no-build case. The preferred alternative also redistributes the exposed population; for example, about 11% of the people within the 65-70 dB contour will be newly included. I want to emphasize that these changes are relative among the different project alternatives; in absolute terms, all alternatives produce an overall decrease in the exposed population at all noise levels, compared with current (1998) conditions.

Restricting Night-time Flights and Hush-kitted Aircraft.

The ESPR shows that the phasing out of stage 2 aircraft by the end of 1999 has produced a decline in the total annual noise produced by Logan aircraft. In the longer term, however, both total annual noise and night-time noise are projected to increase as the number of flights in an all Stage 3 fleet rises. Moreover, many of the aircraft currently operating at Logan are actually stage 2 aircraft that have received mechanical alterations ("hush-kits") to meet the minimum requirements for stage 3 aircraft. These planes are significantly noisier than new aircraft specifically designed to meet stage 3 requirements. Many scheduled nighttime flights, and most in the very early morning hours, are cargo operations in hushkitted Stage 2 aircraft. Thus, the noisiest flights at Logan tend to occur at those times when neighboring communities are most affected by noise. Yet because these planes technically meet Stage 3 specifications, Massport cannot impose access restrictions on them pursuant to the Airport Noise and Capacity Act of 1990 (ANCA). [2]

ANCA effectively requires approval by the Federal Aviation Administration (FAA) (under FAR Part 161) for any local or state noise rules that would restrict the number or schedule of Stage 3

2 Several members of the Massachusetts Congressional delegation have commented on the Airside project. I urge them to maintain an active interest in areas such as this, in which otherwise feasible mitigation for airport impacts is preempted by federal law.

aircraft (except for restrictions designed to correct an overscheduling condition). The FAA has acknowledged that no Part 161 approval of this type has ever been granted, and many commenters have referred to the FAA's Part 161 process as one that is "designed to fail." The FEIR and Proposed Section 61 Findings commit Massport to working with airlines to voluntarily end the use of hushkitted aircraft at Logan. To date, U.S. Airways and the Delta Shuttle have already converted their Logan fleets. In addition, Massport is required in the ESPR process to pursue a Part 161 waiver for night-time restrictions.

Compliance with PRAS Goals

The Preferential Runway Advisory System (PRAS) goals is a set of voluntary targets for FAA runway assignments, aimed at ensuring a more equitable regional distribution of aircraft noise among all affected communities, at avoiding the prolonged dwell or persistence of noise over any one community, and at routing flights over water. The goals were initially developed in the early 1980s, through consultation among Massport and certain affected communities. The FEIR demonstrates that the preferred alternative (Alternative 1A) will significantly improve compliance with PRAS goals, and that adding Peak Period Pricing (Alternative 1) will improve compliance still further. (61% and 69% improvements, respectively -- see Attachment A.) The FEIR includes protocols for monitoring adherence to the PRAS goals, including quarterly reports, plus annual statements in the ESPR update.

The general goals of the PRAS program appear to be uncontroversial. However, setting exact numerical targets for the PRAS involves difficult judgments about the relative weighting of different levels and types of noise impacts upon both neighboring and more distant communities. These judgments are essentially political in nature, and require consensus among the participating communities. Commenters have noted that changes in land use patterns and residential densities may have altered the validity of the assumptions under which the PRAS program was developed. For example, greater PRAS compliance may lead to more flights from Runway 27 over the South Boston waterfront, now planned for extensive new parks and housing. The CAC has stated that it no longer supports the current PRAS system, and that the system needs to be revamped.

Because of the CAC's withdrawal of support, it is clear that a revamping of the system is necessary. At the same time, to make agreement upon a new set of goals a condition of project commencement might serve as an incentive for delay. Therefore, I am requiring Massport to commit to begin working with the CAC to update the PRAS program, as part of its Section 61 Finding, with the proviso that the current system will remain effective until superseded.

Soundproofing.

The primary mitigation commitment for noise impacts described in the FEIR is Massport's federally funded program of residential acoustical treatment (the "soundproofing" program).

While I recognize the limitations of the residential soundproofing program, I believe that the program is and will continue to be an important part of Massport's noise mitigation commitments. In the DEIR Certificate, I required that the Final EIR and the Proposed Section 61 Finding contain feasible implementation measures to ensure full access to the soundproofing program for all residents who are entitled to its benefits.

Massport uses the federal criteria of residing within a 65 dB DNL contour for determining soundproofing eligibility. I want to underscore that under state law, soundproofing must be implemented as a feasible mitigation measure, regardless of whether federal funds are available. Previous certificates and comments have noted that the modeled noise contours do not exactly match the measured field values, and that they appear to somewhat underestimate Day-Night Levels (DNL) of sound. I required that the Final EIR examine further refinements to its contours that would ensure full access to soundproofing for all affected residents. In response, Massport has committed to providing soundproofing for all residents currently within the 65 dB contour, even if the redistribution of noise by this project would otherwise exclude them in the future.

I also noted that the soundproofing program requires that structures within the 65 dB DNL contour meet certain code requirements prior to receiving acoustical treatments. In response, Massport has committed to funding building code upgrades to the extent necessary to ensure that low income residents with substandard housing receive equal access to noise mitigation.

Based on the foregoing, I find that issues of noise impacts have been adequately addressed for purposes of MEPA review.

CENTERFIELD TAXIWAY

The Centerfield Taxiway consists of a 9,300-foot taxiway between runways 4R/22L and 4L/22R. According to the FEIR, the taxiway will allow for alternative taxi routings and more efficient movement between runways and terminal areas. The analysis also shows delay reduction benefits, and associated noise and air quality improvements. The construction of the Centerfield Taxiway will involve the “taking” of the state-endangered Upland Sandpiper (*Bartramia longicauda*), and hence requires permitting under the Massachusetts Endangered Species Act (see the Rare Species section below.)

The construction of the Centerfield Taxiway has generated concern, particularly from the close-in communities, over potential for increased air pollution, odor, and noise impacts. Taxiing procedures employed by individual airlines can have a major impact on local air quality in neighborhoods adjacent to the airport. The use of single engine taxiing procedures can significantly reduce air emissions and noise associated with taxiway operations. Currently at Logan, Delta Airlines has a commitment to use single engine taxiing whenever feasible. Expanding this practice to other airlines could yield significant environmental benefits. Massport, in its Section 61 Finding, needs to commit to developing a program designed to

maximize the use of single engine taxi procedures by all of its tenant airlines.

In addition, within the ESPR process Massport shall conduct follow-up air quality monitoring in neighborhoods surrounding the airport and under the flight path of Logan Airport. This information will be shared with the Department of Public Health (DPH) and reported in the ESPR update, to provide baseline data for future studies. Massport should consult with DEP and MDPH in developing an air quality monitoring protocol using periodic air sampling in residential areas with a special focus on air toxics. Massport should also complete within the next five years a special air toxics monitoring study that will include a public meeting to discuss the results. Based on the foregoing, I find that issues of centerfield taxiway impacts have been adequately addressed for purposes of MEPA review.

REGIONALIZATION

The FEIR includes a detailed discussion of Logan's role in the regional transportation network, which also includes the rapidly growing regional airports in Providence (5.15 million passengers in 1999, up 11%) and Manchester, NH (2.83 million passengers in 1999, up 45%), and the facility at Worcester now being operated by Massport (106,000 passengers in 2000, up more than 100%). Amtrak's new Acela service, which began in December 2000, is projected to divert 1.2 million passengers a year, about one-third of the total New York-Boston market.[3] The FEIR shows that Logan's catchment area is shrinking, and most growth in regional air traffic is taking place at Providence (T.F. Green Airport) and Manchester. This diversion of passengers to regional alternatives is the major factor in the lower growth projections for Logan. The FEIR suggests that future passenger levels at Logan are not likely to attain the projected level of 37.5 million until 2015 (as opposed to the DEIR estimates of 37.5 to 45 million annual passengers by the year 2010).

The FEIR reports on the current status of ground access improvements to all four airports, as proposed by state transportation agencies in Massachusetts, New Hampshire, and Rhode Island. Massachusetts-sponsored projects include:

- MBTA rail service to T.F. Green Airport at Providence.
- MHD's widening of Route 3 from Route 128 to the New Hampshire border by MHD (MEPA review complete, construction started).
- Better roadway access to Worcester Airport (EIR under preparation by MHD).

As required in the DEIR certificate, the document quantifies the effects of these measures upon projected passenger levels at each of the airports, including Logan (excluding the uncertain benefits of teleconferencing), and it summarizes existing information on the predicted

3 I note that the Federal Railroad Administration, Amtrak, and others have voiced concerns over the potential impacts of city-sponsored air rights development at Boston's South Station upon the Acela. In my DEIR certificate on that project (EOEA #9131) I required a detailed study of the potential construction period and permanent impacts on Amtrak and MBTA service, to protect the station's transportation capacity.

environmental impacts at each facility.

Massport's efforts at regionalization have won favorable comment. Nonetheless, many comments and the FEIR itself state that "more can be done" to achieve regionalization of air traffic in New England. Additional measures are likely to emerge from the New England Airports System Study, recently launched by Massport, the FAA, and the other regional airport directors. There is, however, one concrete step that many commenters have suggested could be taken in the near-term. In its Section 61 Findings, Massport should commit to making all of its Logan Express satellite parking lots and stations available for third-party bus and park'n'ride connections to other regional airports, including Manchester and Providence. Based on the foregoing, I find that issues of regionalization have been adequately addressed for the purposes of MEPA review.

GROUND TRANSPORTATION

As stated in the DEIR Certificate, I did not require a detailed analysis of Massport's ground transportation strategy within the FEIR, both because the ESPR contains a substantial body of analysis of ground transportation issues, and because the West Garage Section 61 Finding includes enforceable commitments for airport-wide ground transportation mitigation.

The FEIR does describe proposed MBTA improvements in transit access to Logan, including:

- AITC (EOEA #10235) – construction of the Silver Line tunnel is underway, and Massport has purchased 8 vehicles for AITC use.
- Blue Line modernization (EOEA #8772) – construction of the new Logan station is underway.
- Urban Ring – ENF will be filed with the MEPA Office in July.

These projects are key elements in avoiding potential traffic impacts upon adjacent neighborhoods in Boston, Chelsea, and other affected communities.

I want to highlight two MBTA ground transportation projects with particular benefit for Logan, both of which are key transit mitigation commitments for the Central Artery under the terms of the consent order executed with EOTC in September 2000: the Urban Ring and the Silver Line. The Urban Ring project, scheduled to begin MEPA review in July, promises not only to improve transit access to Logan, but also to enhance mobility, economic development, and the quality of life in many of the communities most affected by the airport -- East Boston, South Boston, Roxbury, Cambridge, Somerville, Everett, and Chelsea. As part of the Phase I implementation steps for the Urban Ring, Massport must work closely with the MBTA to ensure that the project design provides the best possible access to Logan for travelers and employees, and that rights of way are properly identified and protected.

The AITC is linked with the South Boston phase of the Silver Line, extending from South Station to the Ted Williams Tunnel. I am appreciative of Massport's commitment, in the context

of MEPA review for the Commonwealth Flats Development Area (EOEA #11882), to undertake a feasibility study for the grade separation of the Silver Line/AITC vehicles at D Street. I call upon public and private parties to ensure that implementation measures arising from the study are carried out in a timely fashion. Improvements to the D Street intersection will greatly benefit both the South Boston waterfront redevelopment and transit access to Logan.

Finally, comments from the City of Boston and others urge that employer participation in the Logan Transportation Management Association (TMA) should be more widespread and effective, as it is at the Longwood Medical Area. I agree with these comments. TMA participation is an effective mitigation measure within Massport's control that can significantly affect travel behavior and reduce traffic congestion. To date, the TMA was formed as a mitigation requirement for the West Garage project, and employer participation has been tracked through the ESPR. In the Section 61 Finding, Massport needs to detail its commitment to making TMA membership mandatory by all Logan employers at the earliest possible opportunity. Upcoming ESPR reports should document, in greater detail, participation by major employers, affirmative actions (specifically including T pass subsidies or other financial support), and best available estimates of the HOV mode share for employees. Based on the foregoing, I find that issues of ground transportation have been adequately addressed for purposes of MEPA review.

UNIDIRECTIONALITY OF RUNWAY 14/32

Ever since the Airside Improvements project was first proposed, Massport has publicly committed to keeping Runway 14/32 as a unidirectional runway. The FEIR analyzes only the environmental impacts of a unidirectional Runway 14/32, with both take offs and landings following an easterly flight path largely over water (although portions of the South Shore do experience some impacts from "over-water" operations). Any proposal to use the runway in a bidirectional manner would need additional MEPA review, including the scoping, preparation, and review of an entirely new EIR document. The Proposed Section 61 Findings in the FEIR include this enforceable commitment to unidirectionality. The Findings also potentially commit Massport to enter into a binding agreement with appropriate governmental and/or community organizations. Based on the foregoing, I find that issues of unidirectionality have been adequately addressed for purposes of MEPA review.

REDUCED APPROACH MINIMA

The project includes a proposed reduction in approach minima at runways 15R, 22L, 27, and 33L. The approach minimum is the lowest point along the glide slope during the landing at which point the pilot must make a decision to commit to a landing or execute a missed approach procedure. Reducing the approach minima does not change the height at which planes actually fly.

The FEIR demonstrates that the reduction in approach minima will lead to modest delay

reduction benefits and improve operational flexibility, mostly during poor weather. The reduction in approach minima will also enhance ability to meet PRAS goals, by providing an alternative to landings on runway 4R during poor conditions. The lowered minima should also slightly reduce the number of overflights of close-in communities, by reducing the number of missed approaches. I find that the environmental impacts of the proposed reductions in approach minima have been adequately studied for purposes of MEPA review.

ENVIRONMENTAL JUSTICE

The environmental justice analysis contained in the FEIR addresses the federal requirements of Executive Order 12,898 and Department of Transportation regulations, and it responds to my guidance in the DEIR certificate.[4] The FEIR compares the population affected by noise impacts over 65 dB with that of Boston and the rest of Suffolk County. It concludes that the project causes no disproportionate impacts, because both minority and low-income populations are lower in the affected area than in Suffolk County as a whole. Further, the FEIR concludes that any adverse impacts are adequately mitigated by the soundproofing program.

As discussed in the DEIR certificate, I have also taken comments regarding environmental justice to reflect a broader concern with fairness and the cumulative impacts of airport-wide operations. Therefore, in addition to requiring the further analysis discussed above, in my review of the FEIR and the ESPR I have focused on concrete measures, such as the NOx cap and air quality monitoring described in this certificate, that will maintain or reduce the existing envelope of cumulative environmental impacts from airport operations. Based on the foregoing, I find that issues of environmental justice have been adequately addressed for purposes of MEPA review.

CONSTRUCTION PERIOD

As required in the DEIR certificate, the FEIR includes a detailed analysis of construction period impacts (including the cumulative impacts of other East Boston projects) and a construction management plan that quantifies the number of daily and total truck trips. Massport will require its contractors to retrofit existing heavy construction equipment with emissions control technology, in accordance with DEP's Clean Air Construction Initiative. Based on the foregoing, I find that issues of construction period impacts have been adequately addressed for purposes of MEPA review.

RARE SPECIES

4 EOEA's draft Environmental Justice Policy, which was issued in December 2000, is currently undergoing public review and comment, and it has not yet been finalized. It therefore does not apply to this or other projects undergoing current MEPA review. However, my approach to environmental justice issues, discussed above, are consistent with the spirit and intent of the policy.

The Centerfield Taxiway will alter nesting and feeding habitat of the state endangered Upland Sandpiper (*Bartramia longicauda*). Because the project will constitute the "taking" of a state-protected species under the Massachusetts Endangered Species Act, it will require issuance of a Conservation Permit by the Natural Heritage Program. The FEIR commits to both on-site and off-site mitigation for rare species impacts, including 150 acres of habitat restoration proposed at the Massachusetts Military Reservation. If for any reason the proposed off-site mitigation is not implemented, alternative mitigation would have to be identified and reviewed, in the form of a Notice of Project Change. Based on the foregoing, I find that issues of rare species impacts have been adequately addressed for purposes of MEPA review.

NOTICE OF PROJECT CHANGE

At the time the FEIR was filed, Massport also filed a Notice of Project Change (NPC), based upon the three-year lapse in time since the filing of the ENF, and it requested a determination that no further review was required for the change. The South Shore Coalition and other commenters have requested further review because of the time lapse. The substantive issues raised by these comments, including purpose and need, regionalization, alternatives, segmentation, air quality, noise, and ground transportation, are discussed elsewhere in this certificate. After considering the documents and the comments in light of the factors set forth in Section 11.10(6) of the MEPA Regulations, I find that any issues arising out of the lapse of time have been adequately addressed in the FEIR or the ESPR, as applicable.

SECTION 61 FINDINGS

As required by the Act, the Section 61 Findings that will be adopted by Massport, prior to project commencement, must contain all of the mitigation commitments that emerge from the EIR process. The FEIR includes Proposed Section 61 Findings for each area of impact associated with the project. These Findings must be revised to incorporate all additional mitigations required under this certificate, as well as any further commitments within MEPA jurisdiction that may arise during the federal review process.

6/15/01
DATE

Bob Durand

Attachment A: Relative Benefits and Impacts of Project Alternatives
Attachment B: List of comments received

rd/jhw/asp

Attachment A -- Relative Benefits and Impacts of Project Alternatives

37.5 million passenger – high RJ fleet scenario

	Delay benefits[1]	**Noise distribution benefits[2]**	**Noise impacts[3]**	**Air quality impacts[4]**
Alternative 1 (Runway 14/32 & Peak Period Pricing)	41.1% delay reduction = 152,800 fewer hours of delay	69.4% improvement Index = 943	75 dB: 58 (-74%) 70 dB: 2,020 (-45%) 65dB: 12,470 (+8%) 60 dB: 48,332 (+31%)	1.3% reduction = 95 fewer kg NOx/day
Alternative 1A (Runway 14/32)	29.2% delay reduction = 108,500 fewer hours	62.3% improvement Index = 1,160	75 dB: 58 (-74%) 70 dB: 2,267 (-39%) 65dB: 11,857 (+3%) 60 dB: 50,048 (+36%)	DEIR presumes it to be roughly equivalent to Alternative 1
Alternative 2 (Peak Period Pricing)	18.2% delay reduction = 67,700 fewer hours	6.0% improvement Index = 2,893	See DEIR, Table 6.2-7, for 37.5 million high fleet	0.9% reduction = 65 fewer kg NOx/day
Alternative 4 (no build base case)	372,000 hours of delay	Index = 3,078	75 dB: 222 70 dB: 3,700 65dB: 11,493 60 dB: 36,857	7,092 kg NOx/day

Click here to see comments

1 Source: FEIR, Table 4.7-2
2 PRAS Performance Index, with 0 = perfect compliance. Source, FEIR, Table 4.7-7
3 Source: FEIR, Table 6.2-20
4 NOx emissions, in kg/day, given for 37.5 million - high fleet. Source: DEIR, Table 6.3-5

Appendix B
Section 61 Findings

Building in Boston and Thursday, April 8, 1999 at the Holiday Inn in East Boston, which resulted in the issuance of a certificate from the Secretary of EOEA dated May 7, 1999, in which said Secretary determined that the Draft EIR adequately and properly complied with MEPA and with its implementing regulations and specified certain additional analytic work, including additional mitigation measures and responses to substantive comments, to be included in the Final Environmental Impact Report ("Final EIR"),

WHEREAS, the Final EIR was the subject of an extended public comment period, and of public hearings, and notice of availability of the Final EIR was published in the Environmental Monitor on May 9, 2001, and on June 15, 2001, the Secretary of EOEA issued a certificate determining that the Final EIR adequately and properly complies with MEPA and its implementing regulations, concluding the MEPA review of the Airside Project; and

WHEREAS, these findings will be revised, if appropriate, to incorporate any further commitments within MEPA jurisdiction that may arise during the federal environmental review process;

NOW THEREFORE BE IT RESOLVED AND VOTED:

A. The Authority hereby finds that: (a) the environmental impacts associated with the Airside Project, EOEA No. 10458, and selection and implementation of the Preferred Alternative, are properly and adequately described and evaluated in the ENF, Draft EIR and Final EIR and the description of such environmental impacts set forth in said documents is adopted as a specific finding herein, and (b) by implementing the mitigation measures set forth in the Final EIR as modified by and as authorized and directed by this resolution, all feasible means and measures will be taken to avoid or minimize any environmental impacts as determined by this resolution.

B. The Authority hereby further finds and determines that the improvements constituting the Preferred Alternative as set forth in the Draft EIR and Final EIR will enhance the operation of Logan by improving safety conditions and on-time performance of aircraft and will provide related environmental benefits.

C. The Authority hereby makes the findings set forth below in accordance with M.G.L. c.30, Section 61 and hereby authorizes and directs the Executive Director to implement the measures described herein:.

1.0 Runway 14/32 Unidirectional Limitation

Runway 14/32 will be operated as a unidirectional runway to accommodate over-water flight operations only, i.e., arrival operations in an east-to -west

direction to the Runway 32 approach end and departure operations from a west-to-east direction from the Runway 14 departure end. Construction specifications will require that lighting, marking and instrumentation components of Runway 14/32 be done consistent with the above-described unidirectional limitations. No parallel or other type of taxiway facility will be constructed to allow departures from an east-to-west direction from the 32 end. The Authority will, if requested, enter into an appropriate contract with an appropriate governmental body and/or representative community group(s) to provide rights to enforce the intended unidirectional restriction of Runway 14/32.

2.0 Regional Transportation Policy - Regional Airport Network

The Authority is engaged in promoting increased utilization of regional airports and other travel modes to provide relief to Logan Airport. As an independent authority that owns and operates Logan and Hanscom Field, as well as the Tobin Bridge and many properties in the Port of Boston, and has operational responsibility for Worcester Regional Airport, the Authority is just one of many agencies that influence regional transportation policy. With regard to aviation, the Authority's primary responsibilities are the provision, operation and maintenance of airport infrastructure at Logan and Hanscom Field, and the operation of Worcester Regional Airport.

The Authority supports a regional transportation policy to improve the efficient use of the region's transportation infrastructure by expanding use of the regional airports and other transportation modes, where appropriate. To achieve these goals, the Authority is committed to cooperative transportation planning and is actively working with a broad array of transportation agencies and concerned parties to ensure an integrated, multi-modal regional transportation network. The Authority has undertaken several initiatives to advance the role of regional airports in accommodating a greater share of the region's air travel demand. The Authority is also an active participant in several interagency transportation planning forums pertaining to alternative intercity travel modes.

The Authority's efforts in connection with this Regional Transportation Policy will include:

2.1 Worcester Regional Airport

The Authority will, in accordance with its agreement with the City of Worcester, continue to exercise operational control over Worcester Regional Airport, and continue to work to attract new air service and develop and implement a marketing campaign targeted to travelers and airlines to provide awareness of Worcester Regional Airport and enhance its utilization within its primary service area.

2.2 Cooperative Regional Transportation Planning Initiatives

The Authority will:

- Maintain an aviation information database and distribute quarterly reports that track aviation trends at all of the regional airports to parties interested in promoting regional airport services;

- Compile and issue periodic statistical summaries of passenger levels, aircraft operation counts and airline schedule data at the major New England regional airports;

- Prepare an Annual Report summarizing regional airport trends and service developments;

- Participate in meetings of other regional and state aviation organizations, including the Massachusetts Aeronautics Commission and transportation summit meetings organized by the New England governors;

- Continue to cooperate with the Federal Aviation Administration and directors of other regional airports to undertake and complete a *New England Airports System Study* to evaluate the performance of the regional airports since the completion of the *1995 Regional Airport Air Passenger Service Study*; reevaluate airport market areas and capture rates; evaluate the potential for international, charter and cargo services at the regional airports; evaluate capacity issues at the regional airports; and consider the development of high occupancy vehicle/ground transportation and rail alternatives to improve access to the regional airports;

- Continue to encourage various transportation initiatives (e.g., commuter rail, rail or other links between regional airports) by relevant agencies or other governmental bodies through Transportation Bond Bill or other legislative initiatives that may be required to implement an improved effective regional transportation system;

- Continue to assist in the development of a comprehensive rail plan for New England, including the designation of high rail corridors;

- Continue to support inter-city rail planning through membership in the Metropolitan Planning Organization (MPO); and

- Make the Authority's Logan Express satellite parking lots and stations available on a reasonable commercial basis for third-party bus and park-and-ride connections to other regional airports, including Worcester, Manchester and Providence.

3.0 Residential Sound Insulation

The construction and operation of Runway 14/32 will significantly reduce the most severely noise-impacted populations within the 70 and 75 dB DNL contours in East Boston, Winthrop and Revere. This reduction results from a distribution of flights more consistent with the Preferential Runway Advisory

System (PRAS) goals. However, the change in distribution levels resulting from the availability of Runway 14/32 will also increase the population within the future 65 dB DNL contours in comparison to the No Action alternative and in comparison to 1998 conditions. This increase will be mitigated by providing sound insulation to affected residences (located in Chelsea, East Boston and South Boston) that fall within the 65 dB DNL contour for the Preferred Alternative as defined in the 1999 29M Low Fleet scenario (see Final EIR, Table 8.5-1). The number of dwelling units that will be sound insulated are within the new airport wide contours reflecting the conditions of the 29M Low Fleet DNL contour and the sound insulation program will be structured to meet FAA funding requirements. Relevant FAA general sound insulation program funding requirements do not provide sound insulation benefits for buildings that do not meet applicable building codes. However, in order to ensure that all residents of buildings who would otherwise be eligible for sound insulation do not lose eligibility because of building code considerations, funds will be provided, through special Project mitigation commitments from the FAA, to allow for building code upgrades to be made on individual homes to the extent that building code upgrades are necessary to allow the sound insulation work to be completed. To further ensure that all eligible residences are included within the sound insulation program, the specific identity of residences will be determined based upon a detailed block-by-block analysis to be performed during implementation. If federal funding is not available to complete the sound insulation of homes newly included within the 65 dB DNL as a result of the implementation of the Airside Project, the Authority commits to providing the funding necessary to complete the sound insulation of those homes.

4.0 Tenant Relocation Assistance

As described in the Draft EIR and Final EIR, the construction of Runway 14/32 will require the demolition of existing Cargo Building 60 and Cargo Building 61. The current tenant, pursuant to plans independent of the Airside Project, will vacate Building 61. In connection with its acquisition of Building 60 the Authority will provide relocation assistance to building tenants as required by applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, Part 24 of 49 CFR and M.G.L. Chapter 79A and implementing regulations. Relocation resources will be made available to all eligible business relocatees without discrimination.

5.0 Vegetation and Wetlands

All construction associated with the Preferred Alternative is confined to upland portions of the Logan airfield. There will be no loss of wetlands as a result of the implementation of the Preferred Alternative. During construction, sediment and erosion controls will be implemented within the 100-foot buffer zone of the coastal bank. All areas disturbed by construction will be stabilized with vegetation common to the airfield once re-grading is completed.

6.0 Wildlife

Construction of the Centerfield Taxiway and the Taxiway Delta extension will result in the conversion of approximately 37 acres of grassland to paved surface, thereby eliminating this area as habitat for the upland sandpiper. In coordination with the Massachusetts Natural Heritage and Endangered Species Program (NHESP), the Authority will develop a mitigation plan to address this impact and that will comprise the following elements:

- Alteration of existing airfield grassland mowing procedures prior to the spring arrival of the upland sandpiper to encourage occupation of other areas of the airfield rather than the construction area.
- Implementation of a pre-construction and an on-going pre-mowing upland sandpiper reconnaissance program to ensure that no individual birds remain in the area.
- Off-site habitat enhancement.

Enhancement of bird habitat at Logan is not feasible due to the significant potential for increased aviation hazards. As part of the Conservation and Management Permit process under the Massachusetts Endangered Species Act (MESA), the Authority in coordination with the NHESP will develop a comprehensive onsite and offsite mitigation program to provide a "net benefit to the local population" of upland sandpipers. The offsite mitigation is expected to involve funding from the Authority for a grassland restoration/habitat enhancement program at Camp Edwards on Cape Cod. Under this program, the Authority will provide funds to the Massachusetts National Guard (MNG) for restoration of the former upland sandpiper habitat. A Memorandum of Understanding (MOU) between the Authority and MNG to ensure effective implementation of the program is anticipated. In the event that such a program at Camp Edwards is not available, an appropriate alternative program acceptable to the NHESP will be developed and implemented.

7.0 Water Resources

Construction of the Runway 14/32 and Taxiway components of the Preferred Alternative will result in a slight increase (3.8 percent) in peak runoff to tidal waters. Peak discharges will be minimized through the use of grassed swales and infiltration of runoff. No long-term impacts to water quality are anticipated. The existing stormwater drainage system will be reconfigured slightly to accommodate runoff from the runway and taxiway improvements. A low-flow water quality treatment structure will be incorporated into the existing system to handle the first flush runoff from portions of the airfield, if feasible. Sediment and erosion controls will be installed and maintained during all portions of construction to minimize adverse impacts. Construction will be phased to minimize the extent of bare soil at any one time. All new runway

and taxiway construction within areas subject to DEP's Stormwater Management Policy will be consistent with applicable policies and performance standards.

8.0 Soils

Disposal of soils excavated for runway and taxiway construction will be completed in compliance with the Massachusetts Contingency Plan (MCP), 310 CMR 40.0000, and will be conducted in a manner consistent with the Authority's Soil Management Plan developed for the Logan modernization projects.

9.0 General Construction Mitigation

Appropriate measures to enhance safety and mitigate traffic, air quality, and noise impacts will be incorporated into the contract documents and specifications governing the activities of contractors and subcontractors constructing all construction elements of the Preferred Alternative.

All construction activity associated with the Preferred Alternative will comply with FAA Advisory Circular 150/5370-2C, Operation Safety on Airports During Construction. In addition, the Authority will utilize a number of mandatory construction mitigation procedures for all construction contractors. The Authority will employ a team of on-site resident engineers and inspectors to monitor all construction activities related to the Preferred Alternative, including the following management practices:

- Full coordination with the CA/T Project, and with all relevant agencies including the FAA, MBTA, Massachusetts Turnpike Authority, Massachusetts DEP, Massachusetts Coastal Zone Management (CZM), Massachusetts Water Resources Authority (MWRA), City of Boston, Boston Water and Sewer Commission (BWSC), and utility companies, as appropriate.

- Preparation of detailed pre-construction plans for traffic maintenance, construction specifications for contractors, and coordinated scheduling of all construction activities (as well as the other measures noted in the ground transportation sections above).

Construction mitigation measures in a number of categories are described below.

9.1 Construction Traffic Operations

- Construction vehicles will be required to use State highways or Logan roadways, including the Ted Williams Tunnel, except when seeking access to local businesses. A clause to this effect will be inserted in all construction contracts relating to the construction components of the Preferred Alternative.

- Truck routes for Logan projects that minimize impacts on the local communities will be established. Construction vehicles would be restricted from using Neptune Road, Maverick Street, and Porter Street in East Boston. Designated truck routes will be specified in all construction contracts.

- Construction employee parking spaces will not be permitted on the construction site nor will provisions be made for them elsewhere on-airport with the exception of a small number of spaces for supervisory personnel. It is expected that construction workers will access the airport via public transportation or via shuttle buses from off-airport parking areas.

- Police details will be employed at appropriate locations on the airport to manage traffic and ensure public safety.

9.2 Construction Air Quality

- The Authority will require contractors to retrofit their heavy construction equipment with advanced pollution control devices during construction in accordance with DEP's Clean Air Construction Initiative. Contractor-owned equipment such as front-end loaders, backhoes, cranes and excavators will be retrofitted with oxidation catalysts. This device filters out and breaks down hydrocarbons, particulate matter and carbon dioxide associated with diesel emissions.

- During the construction process a regular program of street sweeping will minimize dust from construction vehicle movements on airport roads.

- Fugitive dust also will be controlled with water spray as needed during demolition and construction; no chemical soil stabilizers will be used.

- All trucks hauling demolition materials and excavate from the site will be covered and their wheels will be washed prior to leaving the construction site.

9.3 Construction Noise

General construction noise will be limited using techniques such as:

- Use of: (1) concrete crushers or pavement saws for building demolition or similar construction activity; (2) local power grid to reduce the use of generators, to the extent practicable and feasible.

- Attaching (1) intake and exhaust mufflers, shields, or shrouds; (2) noise-deadening material to inside of hoppers, conveyor transfer points, or chutes.

- Maintaining equipment to ensure peak performance.

- Limiting (1) the numbers and duration of equipment idling on the site; (2) the use of annunciators or public address system; (3) the use of air or gasoline-driven hand tools.

- Configuring, to the extent feasible, the construction site in a manner that keeps loud equipment and activities as far as possible from noise-sensitive locations.

When construction is scheduled during the nighttime hours and near community sensitive areas (e.g., East Boston and Winthrop) the following noise mitigation measures will be employed.

- The use of backup alarms for all pieces of equipment will be prohibited, to the extent appropriate. The Contractor will be required to provide additional laborers to assure that equipment backup safely and comply with OSHA regulations.

- Trucks delivering bituminous concrete or other materials will be prohibited from slamming their tailgates to clean out truck beds after dumping.

- During paving operations, the contractors will be required to turn off their vibratory compactors prior to exiting off the newly place pavement and onto the old existing pavement.

Further noise control options will be evaluated during the ongoing project design to define their effectiveness and feasibility. Appropriate operational specifications and performance standards will be incorporated into the construction contract documents.

10.0 Preferential Runway Advisory System (PRAS) Monitoring and Reporting

The Authority will develop and implement a PRAS Monitoring System and will implement a new distribution system for reports. The Massport Quarterly Noise Reports will be expanded to include a number of new reports, and the distribution list will be expanded to include interested parties, including the Logan Citizens Advisory Committee (CAC). In addition, the annual reports on runway utilization, dwell and persistence will also be included as part of the Environmental Status and Planning Report (ESPR) (formerly GEIR) filings made with the Executive Office of Environmental Affairs. Over the longer-term, the Authority will work with the FAA to design additional reports that could help enhance the attainment of PRAS. In addition, the Authority will begin working with the CAC to update the PRAS program, with the understanding that the current PRAS system will remain in place until superseded.

11.0 Peak Period Monitoring and Demand Management Program

The Authority commits to putting in place an enforceable Peak Period Pricing (PPP) program or an alternative demand management program with comparable effectiveness. The Authority's objective is to set out clear rules

well in advance to allow airlines to predict with certainty the costs of their scheduling decisions, and to modify their behavior accordingly. As a first step, the Authority will establish and maintain a monitoring system that will: (i) provide advance indication of when airline overscheduling is likely to become a significant contributing factor to aircraft arrival and departure delays at Logan; and (ii) identify the portion of the day during which an overscheduling condition would likely occur. The key components of this system will be as follows:

- Projections of Logan flight activity will be developed on a semi-annual basis. These projections will be prepared 4 to 6 months in advance and will represent estimates of flight levels by hour for the upcoming seasonal schedule period. Projections will be based on the most recent activity levels of Logan, historic seasonality patterns, and advance flight schedules submitted by air carriers to the Official Airline Guide (OAG). The projections will also reflect non-scheduled activity including charter and general aviation.

- Logan's average runway capacity under Visual Flight Rule (VFR) conditions will be evaluated as required.

- Delays due to overscheduling will be quantified though an analysis that simulates the projected flight schedules against Logan's VFR capacity. Delays will be estimated by hour to permit designation of a specific peak period when overscheduling conditions are likely to cause significant delays.

Anticipating that delays due to air carrier overscheduling may soon reach or exceed an average level of 15 minutes per flight (which standard is based on FAA criteria) over a period of three or more consecutive hours in a day, the Authority also will take the necessary steps consistent with applicable legal requirements to put in place an enforceable PPP program applied to flights arriving and/or departing Logan during identified peak hours, with a properly structured exemption program component, consistent with federal law requirements. The purpose of the PPP exemption program would be to prevent affected communities from losing access to the national airport system. In the alternative, the Authority will put in place an enforceable demand management program with effectiveness comparable to a PPP program.

The Authority will continue to monitor flight schedules at Logan on a periodic basis and make adjustments to the peak period as warranted by future schedule changes. The Authority will make adjustments to the monitoring system and related action plan as may be appropriate to address the anticipated overscheduling.

12.0 Hushkitted Aircraft

As air carriers and cargo operators phased out their remaining Stage 2 aircraft (gross weight >75,000 pounds) in compliance with federal statutory requirements, some opted to retrofit their older Stage 2 aircraft with "hushkits", designed to reduce noise levels to meet the Part 36 Stage 3 noise limits. Other carriers and operators replaced their Stage 2 aircraft with new technology Stage 3 airplanes. Air carriers and cargo operators at Logan Airport have done both. Substituting new full Stage 3 aircraft results in more significant noise abatement benefits.

The reduction in noise exposure that will be experienced as fleet changes continue depends heavily on how many hushkitted aircraft remain in operation over the next few years. While not related to Airside Project impacts, the Authority will continue to work with air carriers to encourage the use of full Stage 3 aircraft in place of hushkitted equipment.

13.0 Single-Engine Taxi Procedures

The Authority will develop and implement a program designed to maximize the use of single-engine taxi procedures by all its tenant airlines, consistent with safety requirements, pilot judgment, and the requirements of federal law.

14.0 Transportation Management Association (TMA)

While not related to Airside Project impacts, the Authority will, as a matter of policy and at the earliest possible opportunity, use every reasonable measure to make membership in the Logan Airport TMA mandatory by all major employers who are tenants at Logan. In addition, the Authority will seek information from such employers on an annual basis regarding level of participation, actions on behalf of its employees specifically including T pass subsidies or other financial support, and best estimates of the High-Occupancy Vehicle (HOV) mode share for employees.

LOGAN AIRSIDE IMPROVEMENTS PLANNING PROJECT SECTION 61 FINDINGS

RESOLUTION AND VOTE OF MASSPORT BOARD IN COMPLIANCE WITH M.G.L. C.30, SECTION 61

WHEREAS, the Authority has been engaged in long-term planning activities to ensure that flight operations at Boston-Logan International Airport ("Logan") are conducted as safely and efficiently as possible in terms of on-time performance and in a manner consistent with established environmental impact policies and goals, and

WHEREAS, in the context of this planning process the Authority has identified a range of alternatives for achieving these results, including specific improvements to the airfield component of Logan, and

WHEREAS, pursuant to the National Environmental Policy Act ("NEPA") and Massachusetts Environmental Policy Act ("MEPA") and related regulations and other requirements, the Authority has been engaged in an environmental review process to examine a number of aspects of the various alternatives under review, including without limitation, purpose and need, analysis of the current and projected flight delay problem, role of the regional airport system and other transportation alternatives in meeting current and forecast passenger demand, affected environment, environmental consequences, environmental justice, and environmental mitigation, and

WHEREAS, the environmental review process under MEPA commenced with the filing of an Environmental Notification Form ("ENF") on July 31, 1995 for the Logan Airside Improvements Planning Project (the "Airside Project") which was the subject of a formal scoping process, including a public scoping session on September 23, 1995, which process in turn led to the issuance of a Certificate by the Secretary of the Executive Office of Environmental Affairs ("EOEA") defining the scope of the Airside Project Draft Environmental Impact Report ("Draft EIR"), and

WHEREAS, the Airside Project Draft EIR was filed on February 1, 1999, which document included the designation of a Preferred Alternative consisting of the following components: unidirectional Runway 14/32; Centerfield Taxiway; extension of Taxiway Delta; realignment of Taxiway November; improvements to the southwest corner taxiway system; and reduction in approach minimums on Runways 22L, 27, 15R and 33L (which component is an initiative of the Federal Aviation Administration), and

WHEREAS, the Draft EIR was the subject of an extended public comment period, including public hearings on Wednesday, April 7, 1999 at the State Transportation

Appendix C
New England Regional Airport System Plan Scope

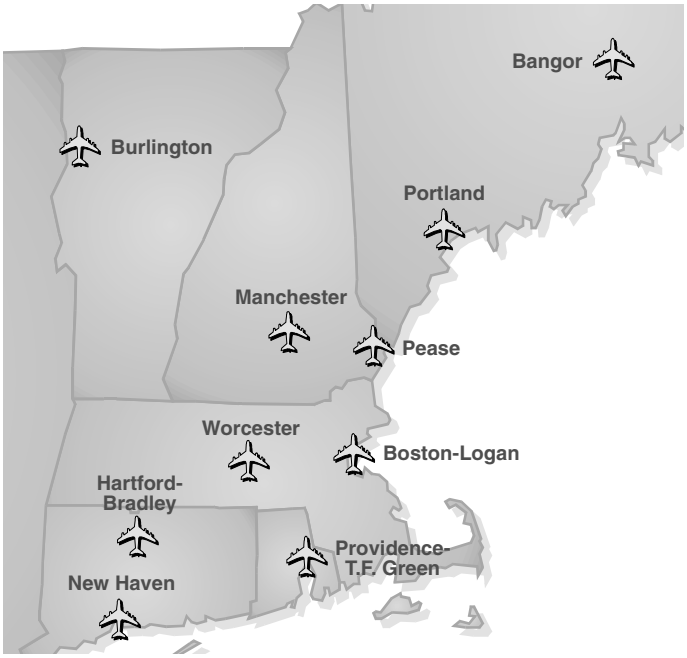
Introduction

The FAA, the New England States, Massport, and other agencies have begun a comprehensive update to the New England Regional Airport System Plan. The purposes of this update are to identify the region's air transportation demand; examine airport issues from a regional perspective; and identify potential actions or policies to meet New England's long-term aviation needs.

This Program Narrative describes the **first phase** of the System Plan Update. The objective of this first phase is to present an **updated, unconstrained forecast** of aviation activity for the entire New England Region, encompassing Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. Forecasts will be completed for short-term (Year 2010) and long-term (Year 2020) periods. Forecasts will be developed for passengers, cargo, and aircraft fleet.

Once derived, the forecasts of demand are distributed to airports that currently provide major air carrier service, or have provided such service in recent years. This set of **Phase I Study Airports** includes:

- Bangor
- Boston-Logan
- Bradley (Windsor Locks, CT)
- Burlington
- Manchester
- Pease International Tradeport
- Portland
- T.F. Green (Providence, RI)
- Tweed-New Haven
- Worcester Regional



Several other New England airports provide air passenger service. Nantucket, Martha's Vineyard, and Barnstable-Hyannis in provide air service to Cape Cod and the Islands, which increases significantly during tourist seasons. Hanscom Field currently provides limited niche commercial service. Other airports, such as Presque Isle, Rutland, and Groton-New London, have limited regional or commuter air services.

The current roles and activity at these other airports will be noted in this Phase I Study. The allocation of future demand to these airports will be conducted in Phase II of this System Plan. A work scope for Phase II will be developed as part of this Phase I Study, as discussed in the attached Study Approach.

This Project Narrative provides a background to this study with a statement of purpose and need; an overview of the forecast process; a description of the project team and its organization; and the study approach and schedule. Supplemental information, such as DBE status, letters of coordination, and the Memorandum of Understanding between the New England states for this Phase I Study are provided in other sections of the Project Application.

Project Purpose and Need

This section reviews the purpose and need for the Regional Airport System Plan. It should be stressed, however, that only Phase I of this System Plan is described in this Program Narrative.

Justification for an Update to the 1995 New England Regional Air Service Study

Aviation demand across New England continues to grow in response to increases in income, lowered fares, and changes in travel patterns. The FAA has recently forecast an additional 23 million annual passengers above current levels within the New England region by 2010. As this growth continues, airports across New England are evolving, as are their roles within the regional aviation system.

In the face of such growing demand that will develop with or without adequate facilities, to do nothing is an expensive proposition. It will guarantee increased levels of congestion at airports and needlessly heighten the impacts of air and noise pollution on neighboring communities. Meanwhile, passengers may have to drive considerable distances to access congested airports and bypass under-utilized facilities that are closer to their homes or businesses. The typical strategy of airlines to concentrate their resources on the largest markets works against market resolution of this issue.

The 1995 New England Regional Air Service Study, which followed the recognition of that the Commonwealth of Massachusetts was unlikely to develop a Second Major Airport, was an initial and very successful effort to identify the need for increased airline services at regional airports. The data gathered in this Study enabled the regional airports to successfully market themselves to the airlines. Aided greatly by the entry of Southwest Airlines into these markets, T.F. Green (1996) and Manchester International (1998) have experienced the rapid increases in passengers that were identified by that study.

Together with other studies, such as the 1993 Strategic Assessment Report, the 1995 New England Regional Air Service study has guided regional transportation decisions and many of its recommendations have been implemented. In addition, the 1995 Air Service Study provided an overview of previous regional aviation planning efforts and presented existing air service levels at nine regional airports throughout the six New England states. The report focused exclusively on passenger operations.

As part of the analysis, the report estimated the degree of leakage (i.e. passengers in an airport's service area that use Logan or one of the three New York City Airports) experienced within the region. Other issues addressed included the potential for new or improved service at the regional airports; potential benefits of improved regional airport service on Logan; development of a regional airport fare sampling methodology; and an analysis of the results of a common fare pricing strategy at a regional airport.

A summary of several of the key air service and infrastructure improvements that have occurred to date include:

- *T.F Green/Providence, RI.* Passenger traffic increased from 2.4 to 5.0 million passengers between 1996 and 1999; major terminal and parking improvements; expanded low cost/jet service.

- *Manchester, NH*. Doubling of passenger traffic, increased frequent and competitive jet service, terminal expansion, runway reconstruction and lengthening, new parking structure, ground access improvements.

- *Worcester, MA*. Terminal improvements and new commercial carrier services have helped to double passenger levels between 1999 and 2000.

- *Hanscom Field*. Reintroduction of niche commercial service in 1999.

- *Hi-Speed Rail*. Amtrak Acela Express services operational between Boston, New York and Washington.

- *Regional Airports Ground Access Improvements*. Construction underway for a new commuter rail station at T.F. Green Airport; planning underway for improved regional access to Manchester Airport; improvement to rail and rapid transit access to Logan under construction; studies underway to improve access to Worcester Regional Airport. Increased commuter rail service to Providence.

Given this initial success, it is important to examine the potential for these trends to continue, to identify what new issues may develop, and to uncover what opportunities may exist to further enhance the operation of New England's regional system of airports. This includes an examination of the potential of other transportation modes to either provide alternative services or to improve the ability of passengers to reach a wider choice of airports. In addition, the New England Regional System Plan Update is the next logical phase of an effective regional aviation planning program that has been ongoing since the late 1980's.

Purpose

In order to reevaluate the system in terms of how it may continue to effectively serve the regional market, questions requiring system analysis include*:*

- How will the increase in regional jets (RJs) impact the services and routes offered at these airports and the system as a whole? Will RJs expand the demand for travel between the New England Region and short/medium range markets?
- What impact will low cost carriers have on the system (i.e. demand stimulation, catchment area expansion, other infrastructure improvements)?
- What can be done to use other transportation modes more effectively as complements to the air service system?
- Are there opportunities to improve airport access and passenger convenience that would encourage use of the regional airports?
- Where can charter, air cargo and corporate GA be best served and how can it be accomplished?
- What can be done to improve air service at the outlying markets of the region?
- What are the constraints to system growth and development?

An investigation of these issues will provide the background and analytical framework for a common understanding of: the current and future demand for aviation services across the New England Region; the roles of the major scheduled passenger service airports and the inter-relationships of those roles on the system; constraints and challenges that will be faced by current patterns of service; and the identification of policies, strategies and infrastructure that would enhance system performance.

Airport sponsors throughout the region will utilize information developed during this study as a framework for integrated regional aviation planning and for consideration in long-range facility planning.

The updated plan would serve as a guide for the regional airports system to cooperatively work towards system-wide improvements. This project will not, in its initial phase, implement any of the programs or recommendations.

A two-phase process is envisioned for the project. As outlined herein, the first phase of the study would focus

on forecasting of regional aviation activity out to 2020 and defining existing and planned facilities for each of the regional airports. Together, this information would facilitate a stronger understanding of current and future demand for passenger and cargo activity across the New England region. It will also characterize the ability of the individual airports to meet forecast demands and help identify where system facility improvements may be needed to enhance region-wide transportation. An important element of this study would be an analysis of intermodal transportation opportunities throughout the region. There also needs to be an understanding of the relationship among the New England regional airports.

The anticipated products of Phase I would be:

- New or updated unconstrained regional passenger, operations, cargo and fleet mix forecasts;
- Updated catchment areas for the Phase I Study Airports;
- An understanding of facility needs to accommodate anticipated growth;
- Identification of alternative strategies to meet demand; and
- A work scope for Phase II.

Phase II of this Project will develop and evaluate a wide range of strategies that could support a regional approach to enhanced air service. These strategies could include alternate air service scenarios, major public policies, and federal aviation policies and regulations that could guide regional system planning.

The Forecast Process

Note: In this section, an overview of the forecast process is presented. The purpose of this overview is to provide an introduction to the elements of forecasting, and to introduce some frequently used terms. The actual methodology used for this Phase I Study is contained in the Study Approach (starting on page 10).

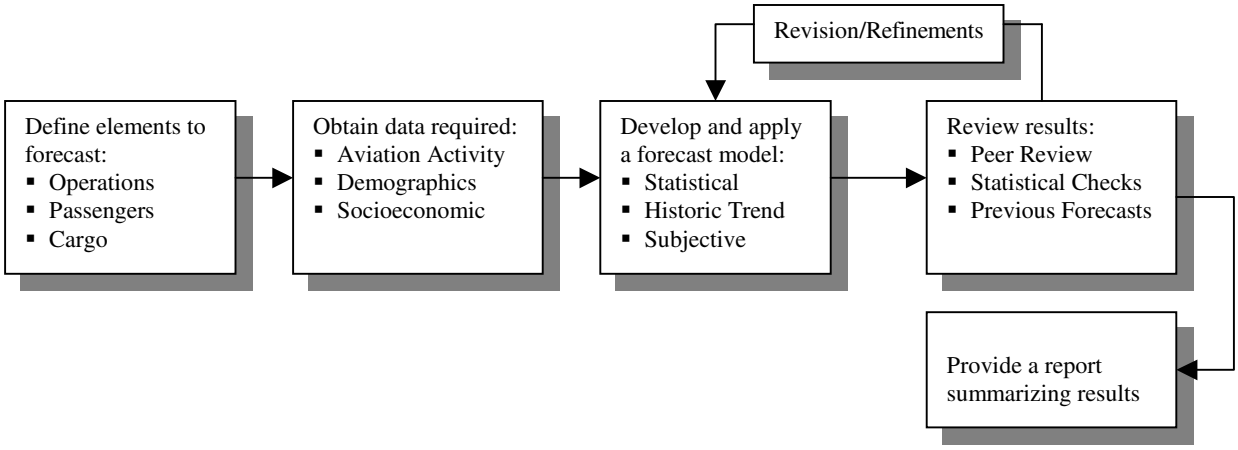
The purpose of aviation forecasting is to estimate future activity at one or more airports. The extent and detail of a forecast effort varies, based on the number of airports under study, the size and complexity of the airports, their level of activity, and other factors. Generally speaking, a typical forecast will estimate:

- The number of aircraft operations. An **operation** is defined as either a landing or a takeoff.
- The number of **passengers** using the airport(s).
- The amount of air cargo (in pounds or tons) processed by the airport(s). Cargo is usually forecasts in terms of **inbound and outbound cargo**.

These basic elements can be studied in many ways. For example, aircraft operations can be subdivided into air passenger (i.e. airline), cargo, general aviation (i.e. private users), and military. These categories can be further subdivided if needed; for instance, air carrier operations can be classified in terms of route (international, domestic, etc.) or the type of carrier (major airline, commuter, etc.). In addition, passengers may be estimated in terms of the number of passengers enplaning (boarding) aircraft (i.e. enplaned passengers) plus those deplaning (deplaned passengers).

In a typical forecast, airport activity is estimated for up to a twenty-year period (sometimes called the **planning horizon**). Forecasts can be produced for each future year, or for every 5-, or 10-year period. In addition, annual forecasts can be used to estimate monthly, daily, and even hourly activity.

There are many ways to estimate future airport activity, from sophisticated mathematical modeling to simple estimates based on interviews with airport users. The technique used depends upon both the purpose of the forecast and the amount of information available. Regardless of technique, however, the basic forecast process is the same; this process is outlined below.



The first step in a forecast is to determine the elements to be forecast, and for what time periods. The forecast elements depend upon the objectives of the overall study. For an airport master plan, for example, the ultimate

objective is to estimate the size and extent of airport facilities (such as runways, terminals, parking, etc.), so detailed forecasts (i.e. monthly, daily, and hourly estimates) are needed. For a system plan, on the other hand, the objective is more broad, so detailed forecasts are not required.

Once the forecast elements are defined, historical aviation activity and historical demographic and socioeconomic statistics (i.e. population, employment, per capita income, etc.) are obtained. Historical aviation data provides insights into how aviation activity changes over time. Historical demographics and socioeconomic data are critical because the number of people and the economic conditions of a region usually drive aviation activity.

After the necessary data are gathered, initial forecasts are produced. There are many ways to develop forecasts. Techniques include:

- **Historical Trend**: The past trend in activity is studied, and a forecast based on that trend is produced. For example, the historical data may indicate that passenger enplanements have consistently grown at 3 percent annually. Absent any other information, this growth rate could be applied to future years. Of course, this technique makes the major assumption that nothing will occur to change past growth patterns.

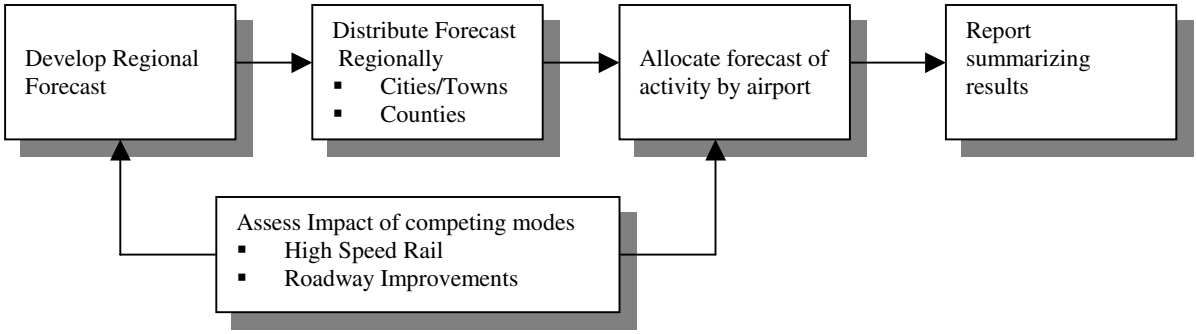
- **Statistical**: A relationship between historic airport activity and demographic and economic data is defined, and a "forecast model" is produced. For instance, the number of passengers using an airport is usually related to the number of people in a region and the relative income or employment level of these people. Often, statistical modeling techniques such as regression analysis can be used to create these forecasts.

- **Subjective**: In some situations, such as when no historical data are available, professional judgement must be used to develop forecasts. For these cases, there are a range of techniques (such as interviews with airport users, panels of forecast experts, the "Delphi method" to develop consensus forecasts, etc.) that can be applied to develop activity forecasts.

After a forecast model is initially developed, it must be reviewed. Models can be evaluated using statistical tests, which determine the accuracy of the results. They can also be reviewed by independent forecast experts (i.e. peer review) to insure that the model has incorporated the appropriate factors, such as regional demographics, historical trends, etc.. Based on these reviews, the models may be refined.

Once the model is checked and verified, future activity is forecast. This is accomplished by applying projections of the demographic and economic data to the model. These projections are obtained from state, regional, or local government agencies, or from independent forecast specialists. The final results are then incorporated into a report, with supporting documentation.

System planning involves forecasting for several airports. Basically, the overall forecasts are distributed to airports using a "top-down" approach. This process is called "top-down" because it begins with a total regional forecast (the "top") and distributes it "down" to specific airports, as outlined below.



Once the overall forecast is produced, the total aviation demand is distributed geographically. This is accomplished through a review of the demographic data, passenger surveys, and other information. Once the demand is distributed, it is then allocated to each of the airports in the system. This allocation is based on the location of the airports and ease of access, level of services, costs of air service, and other factors. The **Study Approach** discusses these factors in more detail.

Aviation is but one mode of transportation. Improvements to highway or rail service that significantly reduces travel time between two cities (e.g. high-speed rail service from Boston to New York) could change the level of aviation demand between these destinations. In addition, improved access (e.g. such as a direct rail link to a major airport) can affect demand to that airport vs. one of its competitors. Thus, a system plan forecast should examine the effect of other modes on regional aviation demand.

An alternative technique is the reverse, or "bottom-up" procedure. The problem with that method is that it forecasts each airport individually, and does account for the interactions between airports and the overlap in the areas they serve. A bottom-up process would thus tend to overestimate total demand.

In later sections, the overall project approach for this Phase I Study is described in detail.

Project Organization

Phase I of the New England Regional Airport System Plan will be completed through the coordination of several states, major airports, FAA, a consulting team, and an independent government research agency. The project organization consists of several teams, as defined herein.

The project contract will be signed between the consulting team, the Massachusetts Aeronautics Commission (MAC), and the Massachusetts Port Authority (MPA). MAC and MPA are co-sponsors for this project. These agencies will be responsible for contract coordination and administration.

Project Management Team

The Project Management Team (PMT) consists of FAA, MAC, MPA, the other five New England States, Manchester International Airport, and the Rhode Island Airport Corporation (RIAC). With the exception of FAA, all of these parties have signed a Memorandum of Understanding (MOU) that outlines the objectives of the Phase I Study and the role of each signatory. A copy of the MOU is provided in Part VII of the Project Grant Application.

The PMT's role in this study will be to:

- Assist in development of the study scope and approach;
- Provide general guidance to the consultant during the study;
- Establish Forecast Principles and Assumptions, as discussed in Task 2 of the Study Approach;
- Coordinate with appropriate state and regional transportation agencies;
- Inform the public;
- Review and comment on draft reports; and
- Provide data, such as historic socioeconomic information, transportation network data, and other information.

Representatives from non-signatory Phase I Study airports (Pease International Tradeport, Tweed-New Haven, Portland, Bangor, and Burlington) will be invited to PMT meetings to represent their airports, and will review and comment on draft reports.

Peer Review

An independent peer review will provide an objective assessment of the forecast process, methods, and results. The peer review process will include nationally respected transportation, environmental, and planning experts. These persons will provide a broad review of the study, to insure that it is being completed in an unbiased, thorough, and professional manner.

In addition, the **Volpe National Transportation Center**, located in Cambridge, MA will provide detailed technical reviews of the work. The Volpe Center is operated by the United States Dept. of Transportation as an independent multi-modal transportation research center. Their staff includes nationally renowned experts in aviation and transportation planning. Volpe Center staff will actively participate in PMT meetings, provide review and critiques of technical documents, and provide technical advisory services as required. Volpe Center will also provide input on the key issue of passenger diversion from air to high-speed rail.

A copy of the Agreement between Volpe Center and the Project Administration Team is provided in Part VII of the Grant Application.

Project Consultant Team

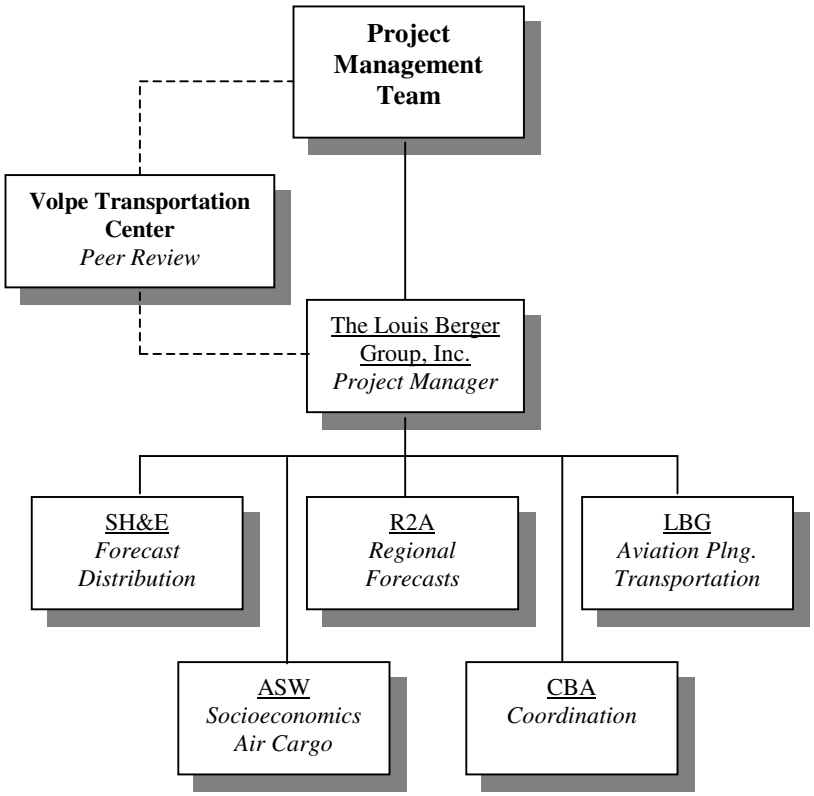
The Project Consultant Team will be responsible for completing the technical analysis, under the direction of the Project Management Team.

This Team consists of the following firms:

- The **Louis Berger Group, Inc**. (LBG) is the prime consultant, and will be responsible for project management and administration, team coordination, transportation planning and airport planning.
- **Roberts, Roach & Associates, Inc**. (R2A) will be responsible for developing the overall regional forecasts.
- **Simat, Helliesen & Eichner** (SH&E) will be responsible for distributing the regional forecasts to the local/airport level.
- **A. Strauss-Wieder, Inc**. (ASW) will be responsible for analysis of socioeconomic data, and for completing the air cargo forecasts.
- **Claire Barrett Associates** (CBA) will assist in the coordination process, development of newsletters and the website, and organize public briefings.

Staff resumes are attached in Part VII of this Application. The project organization is summarized below:

Project Organization



Study Approach

Phase I of the Regional Airport System Plan consists of ten tasks, outlined herein.

Task 1: Study Design

Objective: The purpose of this task is to finalize the work scope, to establish coordination procedures with the PMT, and to define administrative processes.

Approach: The work scope will be reviewed and refined through discussions between the Project Management Team and the consultant. As part of this work, key project issues will be discussed, such as:

- Project schedule and milestones
- Administrative and Contractual procedures
- Coordination with the Volpe Center (peer review)
- Public coordination

Finally, the coordination process (see Task 10) will be refined.

Products: The results of Task 1 will consist of a completed *Project Application*, with the proper number of copies available for distribution to the Project Management Team.

Task 2: Forecast Principles and Assumptions

Objective: The purpose of this task is to establish the underlying principles and assumptions that will guide the development of the forecast update.

Approach: Before the forecasts are developed, key assumptions and planning principles upon which to base the projections must be defined. For example, if the role and mission of one of the Phase I Study airports in the study have been established, this role must be defined and incorporated into the analysis. If a state has established a policy or strategy towards highway development, this too should be integrated into the forecasts. Finally, the long-range economic development goals of a state, and its potential role in the global economy, could profoundly affect aviation demand. These principles and assumptions will be identified for later input to the forecast process.

A *Planning Workshop* will be used to obtain this information. The Workshop will be organized as follows:

- Workshop attendees will consist of the Project Management Team, peer review personnel, and the consultant.

- The Workshop will last one day. It will be held offsite (i.e. at a hotel or conference center) and will be carefully structured and facilitated.

- The Workshop will begin with a general session to review the purpose of the meeting and the study (descriptive materials will be forwarded to attendees prior to the meeting). Next, the workshop will break into separate sessions to discuss topics such as transportation policy and regulations; airport roles; and economic development plans and strategies (the actual topics will be defined in Task 1). The group will reconvene at the close of the workshop to summarize its findings.

- A summary of findings for each workshop will be developed that describes the information obtained and issues discussed.

Based on this Workshop, a set of draft Forecast Principles and Assumptions will be established. This material will be sent to each state and member of the Project Management Team for internal review and comment. After all comments have been received, a final draft version of Forecast Principles and Assumptions will be created in coordination with the Project Management Team and peer review. This draft will be available to the public prior to a set of public briefings, as described in Task 10. A final version of the Paper will be produced incorporating or addressing public input.

Products: The products of Task 2 are a draft and final version of a Technical Paper entitled "*Forecast Principles and Assumptions"*.

Task 3: Data Collection

Objective: The baseline data necessary for the study will be obtained.

Approach: The data collection task will include:

- **Study Area Socioeconomic Data**: Demographic data will be obtained for the overall region; the six states; the New England County Metropolitan Areas (NECMAs); counties and cities/towns. The data will include: total population; total personal income; total employment by industrial sector; and average wages. The State Departments of Labor, Commerce or Economic Development and other organizations can provide most of the historical data and some forecasts for New England.

- **Airport Facilities**: The consultant will contact the Project Management Team and other Phase I Study airports to request data on these facilities. Data requested will include: the current ALP and Master Plan; recent planning or environmental studies, and the Capital Improvement Program. A field visit for each of the Phase I Study airports will be conducted to verify current conditions, observe airport activity, to review overall field conditions. The airport manager will be contacted to discuss current conditions and concerns relevant to this study. Land use conditions proximate to each airport will be inventoried, based on readily available data.

- **Aviation Activity**: Current and historical levels of aviation activity for the New England airports will be compiled, including passengers, air cargo activity, air carrier, regional and commuter operations, charter activity, aircraft mix, and general aviation operations. International and domestic activity levels will be identified. Data will be obtained from the airports, previously performed surveys, published airline schedules and the US DOT T-100 Database.

- **Origin/Destination Passengers and Average Fares:** Current patterns of origin/destination passenger levels at the Phase I Study airports will be collected, using the US DOT Origin-Destination Passenger Survey. These surveys (taken from a 10% sampling of all airline tickets for large U.S. certificated carriers) provide the departure and arrival airport for air passengers. Significant changes in O/D patterns since the 1995 New England Air Service Passenger Study will be identified. A 10-year history of passenger demand by airport will be compiled, and average passenger fare data by market will be collected. These data will be analyzed to determine changes in fares at the other Phase I Study airports relative to Logan Airport.

- **Scheduled Airline Services:** Current patterns of scheduled airline services at the Phase I Study airports will be compiled and significant changes in regional air service patterns since the 1995 study identified.

This will include the addition of new nonstop markets, new air carriers, discontinued services, and the use of regional jets. Aircraft fleet mix and composition, as well as aircraft orders and options for the major carriers serving the New England market area will be reviewed.

- **Air Cargo**: A profile of the current users of air cargo services affecting the study area will be developed. Major air cargo carriers, including airlines, all-cargo, and integrated carriers, will be identified and profiled. While the focus will be on industrial users and third parties, the role of air cargo movements in shipping packages to consumers (via mail order or Internet purchases) will be recognized. Key air cargo customers will be interviewed, either in-person or by telephone. Information regarding available and planned air cargo facilities and flows will be collected as part of the Airport Facilities effort.

- **Ground Transportation Network**: The existing statewide travel demand forecast networks will be obtained from the Project Management Team. The networks will be reduced to two major functional classes, interstate and principal arterials (or equivalents). The six networks will be combined into a seamless New England region network, for later use in the forecast distribution process (Task 7).

- **Intermodal Activity**: Historical and current activity levels for other modes that interact or could influence aviation activity will be obtained. Of particular interest is current and anticipated high-speed passenger rail activity on the Northeast Corridor. The relationship of this activity with airport growth will be examined.

- **Planning Documents and Relevant Studies:** Using the report and data resources maintained by the consultant or obtained from the New England state DOT and airport directors, an inventory of relevant reports, data sources and special studies (e.g., studies of the "Southwest Effect" on air travel demand, techniques for commodity and freight flow estimation published in TRY Research Records, etc.) will be developed. This inventory will focus on both technical reports and data sources relevant to aviation industry and forecasts.

Products: The result of this Task will be a study database that describes current conditions of the region and regional aviation. These materials will be summarized into three *Technical Papers*: *Regional Overview*; *Existing Transportation Facilities*; and *Existing Aviation Activity, Services, and Patterns.*

Task 3A: Passenger and Travel Surveys (optional Task)

Objective: To provide supplementary information on passenger travel patterns.

Approach: As noted in later tasks, the study analysis will rely as much as possible on existing airport passenger and travel agency/ticket-lift surveys. However, if it is determined that existing data is outdated or substantially incomplete, survey methods to supplement existing data sources will be designed, relying on the cooperation of airport operators to implement the surveys. Any survey instrument will be reviewed by the Project Management Team prior to its use. The resulting surveys will be processed, tabulated, and interpreted.

Products: Results of this optional task will be incorporated into the Technical Papers developed in Task 3.

Task 4: Review of Existing Forecasts

Objective: The previous forecast efforts completed for the New England region (national aviation forecasts are reviewed in Task 5) will be collected and reviewed.

Approach: A brief summary of the key precursor studies conducted in support of regional aviation planning in

New England over the past decade will be prepared. These studies include:

- Boston Regional Airport System Study (1989).
- Second Major Airport (SMA) Study (1990).
- Strategic Assessment Report (SAR) (1993).
- New England Transportation Initiative (NETI) (1994).
- New England Regional Air Service Study (1995).
- Master Plan forecasts for Phase I Study airports
- Statewide Aviation/Airport System Plans, including recent/ongoing studies.
- Recent North-South Rail Studies by Amtrak

The relevance and information contained in other reports that might shed light on issues of concern to this project will be investigated. Such studies include the Logan Area Demand Study (LADS, 1990) and the demand forecasts and market analysis undertaken in support of high-speed inter-city rail service provided by Amtrak. Other recent regional aviation forecasts (and their assumptions), including the most recent FAA Terminal Area Forecasts, FAA Aerospace Forecasts, and other publicly available regional forecasts will be reviewed.

Finally, the socioeconomic data and forecasts obtained in Task 3 will be reviewed relative to the requirements for the aviation forecasts. For example, many state forecasts have not yet incorporated the results of the Year 2000 Census; these forecasts may thus require modification or adjustment. All such elements requiring supplemental forecasts will be identified.

Products: Based on these detailed reviews, a Technical Paper will be completed, entitled *Assessment of Previous Regional Forecasts*. The Paper will identify key assumptions that may significantly affect forecast results, and the accuracy of these assumptions given recent and expected industry trends (see Task 5).

Task 5: Regional and Aviation Industry Trends and Socioeconomic Forecasts

Objective: Regional and the aviation industry trends will be identified and discussed. The socioeconomic forecasts that will be used for all the aviation forecasting will also be developed. Trends will be examined at two levels. First, current trends will be summarized and discussed. Next, qualitative issues that could impact future trends of regional development or aviation growth will be reviewed and assessed. The socioeconomic forecasting approach will be designed to produce a consensus forecast for 2010 and 2020.

Approach: This task will be accomplished through five subtasks, as outlined herein.

5.1 Socioeconomic Trends and Forecasts

Forecasts of key socioeconomic indicators will be assembled and developed. The guiding principles in the approach are to (1) involve local economic and industry experts in the development of the forecasts and (2) through that involvement, develop a consensus forecast for 2010 and 2020. The forecasts will be developed using the following process:

5.1.1 Workshop

A **workshop** of 10-15 key economic and industry experts will be organized to identify and discuss key developments in the study area. This "pre-forecast" dialogue will be framed to ensure that emerging trends and "trend-breakers" that specifically relate to aviation demand are identified and discussed. As a background

document for this discussion, a preliminary depiction of the study region and key trends will be developed and distributed to discussion participants.

5.1.2 Baseline Forecasts

A variety of sources and methods will be used to develop the economic forecasts needed as inputs to the aviation forecasts. The goal is to have a single, agreed-upon set of forecasts at the regional, state, NECMA, and city/town levels based on a consistent methodology and the most recent available data (e.g., the 2000 Census).

To that end, forecasts of key independent variables (population, income, non-agricultural employment, hotel/motel employment, and average annual wage bill) will be obtained for the entire United States, New England region (including a portion of Upstate New York), the states, and NECMAs. Information developed from the workshops, and the locally developed forecasts identified and collected during Task 3 will be used to assess the reasonableness of these forecasts.

Economists and industry experts from the workshops will be contacted to review the draft forecasts. This is a crucial step and ensures local input, discussion and consensus on the socioeconomic forecasts that will serve as the basis for the aviation forecasts. After the workshop, the forecasts will be finalized.

5.1.3 City/Town Forecasts

The New England Region includes 577 city/towns. Of this number, 123 towns, which account for over 20 percent of the region's population, are not included in the NECMAs. Econometric models will be developed to forecast the growth of these non-NECMA regions: one non-NECMA region for each state. Combining these forecasts with those for the NECMAs may require some adjustments in the state and region forecasts.

Economic and demographic forecasts are also needed for the 577 city/towns in the region. These will be made by sharing down the economic and demographic forecasts for the 25 NECMAs and 6 non- NECMA areas in New England. The city/town forecasts will take into account both regional and local trends and will be based on the most recent data available.

5.1.4 Air Service Area Forecasts

The regional aviation forecast process also requires socioeconomic data and forecasts for the rest of the country, divided into Air Service Areas (see Task 6) for the years 2010 and 2020. This information (consisting of population, income, non-agricultural employment, hotel/motel employment, and average annual wage bill) will be purchased and reviewed for consistency with forecast model needs.

5.2 Aviation Industry Trends

In this work element, major aviation forecasts recently developed (i.e. Boeing, FAA, Airbus, etc.) will be reviewed and assessed, and the rationale behind them determined. Key differences in these forecasts will be identified and discussed. Major changes to the airline industry that could affect regional aviation activity will be identified and discussed. Such changes include:

- Airline mergers/consolidation
- Introduction of Regional Jets and the institutional barriers to them (i.e. work rules for pilots)
- International operations issues and development of new gateway airports
- Air cargo industry trends

- Airspace issues (Free Flight, LAAS/WAAS)
- Noise Issues (i.e. Potential Stage IV aircraft)

As part of this review, experts in aircraft technology, airspace design, and the airline and air cargo industry will be contacted to discuss trends and their potential impact on future aviation activity.

5.3 New England Aviation Trends

The major changes within the overall New England aviation system will be identified and discussed. The analysis will include changes in major markets (i.e. top 20 markets), service patterns and air service development over the last 5 and 10 years and the impact of the changes on airport traffic levels. Historic and current traffic at each of the region's Phase I Study airports will be analyzed in terms of major destinations, market distances, and air service routings to assess the current roles of individual airports. The analysis will evaluate the impact of low-fare airline expansion in New England and regional jet service trends, and will compare service trends at Logan Airport and the other Phase I Study airports. Major issues that have impacted other airports in the New England region will also be noted and discussed.

5.4 Intermodal Trends

Trends and changes in intermodal commerce will be identified and reviewed, including the ongoing development of improved rail service in the Northeast Corridor. Other issues to be considered include:

- The evolution and use of ground cargo transport options
- Anticipated highway improvements in the region
- High speed water shuttle transportation

As part of this effort, the Transportation Improvement Plans (TIP) for key regions in the study area will be reviewed. With the assistance of the Project Management Team, state and regional transportation planners, including representatives from Regional and Metropolitan Planning Organizations (RPO/MPO) will be contacted to discuss intermodal issues and trends.

5.5 Policy and Regulatory Trends

National and state policy and regulatory changes that could significantly impact aviation growth will be identified and summarized. Issues of concern could include:

- Modifications to national environmental regulations (i.e. Potential Stage IV standards)
- Changes to the role or function of FAA (e.g. separation of Air Traffic Control from the agency)
- Intergovernmental coordination (e.g. New England Council)
- International trade policies

Products: A Technical Paper, *Regional and Aviation Industry Trends* will be developed which summarizes the findings of this task. As part of this Paper, potential "structural changes" to the aviation industry or the regional economy that could impact growth will be identified.

Task 6: Aviation Forecasts

Objective: New England's future air passenger, air cargo, and general aviation demands are forecast, and are distributed across the region. A single (i.e. most likely) unconstrained forecast will be developed, in concert with the Project Management Team.

Approach: A "top-down" approach will be used to estimate the region's overall future air travel demand. The key element of this approach is the development of a regional aviation forecast through creation of demand forecast models between the New England Region and the rest of the country, divided into Air Service Areas (ASA), as described herein. Next, a demand distribution model is developed to allocate the region's projected air passenger demand by point of origination (or destination) within New England.

This approach consists of four subtasks.

6.1 Regional Passenger Demand Forecasts

Regional forecasts for 2010 and 2020 for scheduled domestic and international passengers and charter (unscheduled) passengers will be developed.

6.1.1 New England-US Passenger Forecast

Utilizing a proprietary market driven forecast model, the 73 current domestic 48-state Air Service Area (ASA) definitions will be reviewed. Next, regional domestic market groupings to reflect New England focus will be established, and socioeconomic model inputs (obtained in Tasks 3 and 5) will be reviewed and updated. The model will be calibrated with historic New England domestic passenger traffic, and then run to obtain domestic passenger traffic estimates for 2010 and 2020. The model will produce high and low forecasts with a mid-range point between them likely to represent a reasonable estimate of the most probable outcome. The selection of the preferred forecast will be made in coordination with the Project Management Team. A corresponding number of airline seats necessary to transport these passenger traffic levels will be estimated.

6.1.2 Intra-New England Passenger Forecast

For intra-regional markets within the New England ASA, detailed high/low trend analyses to determine passenger traffic levels for 2010 and 2020 will be determined. A corresponding number of airline seats necessary to transport these passenger traffic levels will be developed. The model results will include demand to and from Cape Cod airports and other seasonal destinations.

6.1.3 New England-Adjacent or Unique Market Passenger Forecasts

For small markets immediately adjacent to the New England ASA served generally by commuter airlines, and for Alaska and Hawaii ASA's that represent unique markets, detailed high/low trend analyses to determine passenger traffic levels for 2010 and 2020 will be developed. A corresponding number of airline seats necessary to transport these passenger traffic levels will be developed. This analysis will include major seasonal markets, such as to and from Cape Cod.

6.1.4 Scheduled International Passenger Forecast

The region's current scheduled international passenger demand and historic growth rates will be determined, based on the US DOT Origin-Destination (O&D) Passenger Survey and estimates of unreported foreign flag passengers. The region's current and historic demand will be analyzed in terms of destination areas (i.e., Europe, Asia, Canada, Caribbean, Mexico and Latin America) and major US gateways (i.e., BOS, JFK, EWR, others). Based on historic patterns and industry projections, forecasts will be completed for international passenger demand for the New England region and the required number of aircraft seats to US international gateway airports for accommodating the forecast demand.

6.1.5 Charter (Unscheduled) Passenger Forecasts

The current and historic charter passenger and operations data from regional airport operators and Massport will be collected and analyzed. In-depth interviews with New England consolidators and tour operators, and consolidators and tour operators located elsewhere, who develop and market New England charter services will be completed. The purpose of the interviews is to determine current charter services, including destinations, flight frequencies, months of operation, and the outlook for charter services. Based on these market assessments, charter traffic potential will be forecast for the region for 2010 and 2020. Forecast charter traffic flows will be combined into logical airport pair segments and the seat totals necessary to transport this charter volume will be developed.

6.2 Forecast Scheduled Passenger Demand at City/Town and County Level

Scheduled passenger demand, which accounts for the overwhelming majority of aviation activity in the region, will be developed on a city/town basis for the region's New England County Metropolitan Areas (NECMAs) and on a county basis for non-NECMA areas as follows:

- **Current Passenger Demand by Ground Origin**: Current geographic distribution of New England air passenger trips by ground origin will be determined, based on air passenger surveys conducted by the Phase I Study airports. Available survey data for the region will be aggregated to develop a comprehensive database of trip generation by city/town, including trip purpose (i.e. resident or visitor, business or non-business) and destination. The data will be evaluated and reconciled with airport passenger levels and available estimates of airport capture rates and leakage patterns. As noted in Task 3, additional targeted airport passenger surveys and travel agency surveys will be conducted as needed to supplement the trip generation database. This effort will provide estimates of catchment area demand and capture rates for the Phase I Study airports. These results will be compared to those estimated in previous studies, and the reason for any significant shifts in regional airport catchment rates will be determined.

- **Trip Generation Models**: Statistical relationships to relate trip generation by ground origin to relevant independent variables will be developed. This analysis will be performed for each segment of scheduled passenger demand (i.e., resident business, non-resident business, resident non-business, and non-resident non-business), since growth in each segment is determined by different variables. The variables considered in the analysis will include population, income, employment, average wages, and hotel/motel industry employment. The analysis will identify distinct relationships for large urban, suburban, and rural areas. If necessary, these relationships can be extrapolated to the rest of New England to determine current trip generation for cities/towns and counties not covered by available airport passenger surveys.

- **Distribute Forecast Regional Passenger Demand by Ground Origin**: The regional demand projections for 2010 and 2020 will be allocated to the local level using models developed above. The results will provide a geographic distribution of the region's demand for the major segments of scheduled passenger traffic. This breakout of future demand will be useful for developing future air service scenarios. Based on available data from the airport passenger surveys, the current reported O&D passenger distribution for each of the study airports, and the regional demand projections from the macro level regional forecast model, the region's current and future passenger demand on a city pair basis for the region's top O&D markets will be estimated.

6.3 Forecast General Aviation Demand

National and regional General Aviation (GA) activity trends and existing forecasts of GA activity (e.g. FAA's Terminal Area Forecasts, the FAA's Aerospace Forecasts, 2001-2012, and individual airport forecasts) will be reviewed. The following measures of historic and future GA activity will be reviewed:

- Fleet by aircraft class (i.e., single and multi engine pistons, turboprops, business jets, and rotorcraft)
- Projected GA aircraft sales
- Trends in itinerant versus local operations
- Popularity of fractional business jet ownership
- Underlying economic drivers of GA activity.

Each airport's GA activity profile will be compared to national and regional GA activity profile and will forecast GA operations by aircraft class for 2010 and 2020 for each airport. The forecasts will primarily be based on historic trends and future GA industry developments.

6.4 Forecast Regional Cargo Demand

A forecast of regional air cargo demand will be completed through the following process:

- A profile of the current air cargo traffic in the study area will be developed. This profile will be based on air cargo statistics obtained from airports within the study area, discussions with air cargo carriers, customers and relevant organizations. In addition, an air cargo database that provides a modal split for inbound and outbound cargo by commodity on a state-by-state basis will be obtained from an industry specialist. The status of these identified industries will be projected, as part of the socioeconomic forecasts, to 2010 and 2020.

- Based on the information obtained previously, the anticipated supply of air cargo facilities in the study region as part of the facility needs task will be projected. This available supply of air cargo capacity will be affected by the availability of belly capacity in passenger aircraft; thus, this work will be integrated with the passenger forecasting for the area.

- The anticipated demand for air cargo will be estimated based on the interviews conducted with key air cargo carriers and customers, published and available projections for overall air cargo demand in the U.S., and extrapolations based on socioeconomic forecasts (which will also provide indications of general economic conditions and consumer purchases).

- A workshop with air cargo carriers and key customers will be held to discuss the initial findings of this analysis. Such a discussion provides an opportunity for comments, discussion and review of the air cargo situation and forecasts for the study area.

After the workshop, the air cargo forecasts for the study area will be finalized.

Products: A Technical Paper, *Airport Activity Forecasts* will be developed which summarizes the analysis of this task and its results. The Paper will include appendices and related documentation to describe the forecast process.

Task 7: Forecasts of Demand by Airport

Objective: The objective of this task is to distribute the estimated demand developed in Task 6.

Approach: Once overall regional forecasts of scheduled passenger, charter, cargo, and GA demand have been established at the regional and municipal level, future passenger activity and operations associated with each Phase I Study Airport in the region will be estimated.

7.1 Identify Future Airport Capacity

Based on the information obtained in Task 3, combined with information from airport operators, the current operational capacity of the Phase I Study airports will be estimated. Using results from previous Master Plans, ALP Updates, and related studies, the following capacity elements will be described:

- Airside Capacity – This element will be defined in terms of Annual Service Volume (ASV) and hourly IFR and VFR capacity.
- Terminal Capacity – In terms of annual passengers per gate and/or square feet of terminal space per passenger.
- Parking Capacity - This element will be shown in terms of total parking spaces available (divided into long- and short-term spaces, if applicable).
- Roadway Capacity – The estimated hourly capacity of the primary airport access road.

Generally, these elements will be obtained directly from previous reports and studies. Where such information is not available, capacity will be estimated using industry "rules of thumb" and preliminary or sketch planning techniques, such as those described in the *Airport Capacity* Advisory Circular.

Any factors that might change capacity, such as ongoing or committed improvement projects, will be noted.

7.2 Develop Initial Scheduled Passenger Service Scenarios

Based on the previous work, including current conditions, user interviews, etc. air service scenarios for each of the Phase I Study airports will be developed for 2010 and 2020. The airport service scenarios will specify destinations, airline, frequency and aircraft type.

7.3 Access Analysis

The regional roadway network model (see Task 3) will be used to estimate base and future travel times between specified cities and the Phase I Study airports. Average drive times will be calculated and displayed as isochrones. These points of equal travel time will identify travel sheds to Phase I Study airports and will also assist in identifying overlapping market areas.

Based on information from bus and rail service providers, the access times to Phase I Study airports by express bus or rail will be estimated. Planned improvements, such as a proposed rail stop at T.F. Green in Warwick will be reflected in the future year systems (2010 and 2020). Comparisons of access times by bus and rail will be displayed as isochrones in the same manner as for the highway system.

7.4 Develop Airport Share Model

An *Airport Share Model* will be developed for the six-state region based on existing generic airport share models. This model will be based on the New England Regional Airport Share Model (NERASM) developed for the last system plan. Key inputs for the airport share model will be: average drive times from each city/town to area airports, scheduled airline services at the Phase I Study airports, and airfares. The model will be calibrated based on existing access time, service and airfare data and current airport capture rates.

7.5 Forecast Future Airport Traffic Levels

The future distribution of scheduled passenger enplanements/deplanements by Phase I Study airport will be forecast using the Airport Share Model. This process is likely to have several iterations as the airport service assumptions are adjusted to reflect passenger service scenarios (Task 7.2), the influence of ground access and

airfares on airport attractiveness.

7.6 Potential Future Airport Capture Rates

Future airport capture rates will be determined based on forecast airport enplanements/deplanements and each Phase I Study airport's theoretical catchment area, which assumes that passengers would use the closest airport if service levels and airfares were equal across airports. Potential forecast airport capture rates will be compared to the capture rates in Task 7.4, and to estimates made in previous studies. These comparisons will identify and explain the reasons for significant shifts in airport capture rates and identify geographic pockets of leakage within each Phase I Study airport's theoretical catchment area. This information will be used to help frame policy alternatives to be defined in Task 9.

7.7 Forecast Cargo Activity

After the forecasts for the overall area have been finalized, the air cargo forecasts will be distributed among the Phase I Study airports and those in the region that currently or projected to handle freight movements in the study period. This work will be closely coordinated with the passenger allocation effort. This analysis will include the potential role of other airports in the region (such as New Bedford and Westfield).

7.8 Distribute Charter and General Aviation Activity

Charter passengers will be allocated to airports based on charter service scenarios developed from the charter market assessment and interviews with major tour operators serving the New England market. General aviation activity will be allocated to airports based on historic trends and forecast assumptions taking into consideration existing constraints in the regional airport system.

Products: A Technical Paper, *Forecast of Demand by Airport*, will be produced which summarizes the finding of the Task. The Paper will include appendices and related documentation to describe the forecast process.

Task 7A: Alternative Forecast of Demand by Airport (Optional Task)

Objective: In this optional task, one (1) alternative forecast by airport are developed. *This task assumes that the macro-forecast created in Task 6 are not changed, but that one or more of the assumptions used to distribute demand are modified.*

Approach: This optional task consists of the following elements. Note that this optional task includes no more than two (2) meetings with the Project Management Team, and requires no additional coordination. The documentation for this optional task consists of a modification to the previous Task's Technical Paper; no additional documentation is included.

7A.1 Development of the Alternative Scenerio

The consultant will meet with the PMT to develop the alternative distribution of forecast demand. At the meeting, the Task 6 macro-forecast will be used as the starting point to construct one (1) alternative scenario, which will be an addition to the primary scenario analyzed in the preceding tasks. The scenario may depict alternative passenger, cargo, airport capture, charter and/or cargo assumptions. Meeting participants will discuss and agree on a set of assumptions for the alternative forecast.

Following the meeting, a summary of the alternative scenario and underlying assumptions will be submitted to the PMT for their review and approval. The analysis of the alternative scenario will occur only after PMT

approval has been received.

7A.2 Redistribution of Passenger Demand

The assumptions established in the review process will be incorporated into the Airport Share Model, and demand will be redistributed based on those assumptions. A single redistribution of demand will be accomplished.

7A.3 Future Airport Capture Rates

The future airport capture rates developed in Task 7 will be reviewed in light of the revised assumptions, and capture rates will be modified based on these assumptions.

7A.4 Revised Cargo, Charter and General Aviation Activity

Forecasts of air cargo, charter and general aviation activity will be modified, if required by the revised assumptions.

Products: The Technical Paper associated with Task 7 will be revised and expanded to incorporate the results of this optional task. The alternative forecasts will be presented to the PMT for review.

Task 8: Airport Facility Assessment

Objective: The purpose of this Task is to assess the ability of the Phase I Study airports to meet unconstrained forecast demand in the study area, and to broadly identify facility enhancements or other strategies that would be needed to meet this demand. This effort is not intended to replace or supercede a current Master Plan or Airport Layout Plan. It is designed to identify key facility improvements at the Phase I Study airports that would be required to meet the unconstrained forecast demand.

Approach: For each Phase I Study airport, the facility enhancements that would be needed to meet forecast demand will be developed based on the forecasts created in Task 7. This analysis may consider:

- Airside
- Terminal Area
- Groundside (access, parking)
- Airspace
- Air Cargo and General Aviation

In addition, alternative strategies for meeting demand at each of the Phase I Study airports will be identified. These strategies could include:

- Development of new facilities, as identified above
- Enlargement of existing facilities
- Relocation of demand to other airports or modes
- Other regional alternatives

As part of this task, the current Master Plan or ALP of the Phase I Study airports will be carefully reviewed. Airport management will be contacted to discuss the implications of the forecasts relative to the airport's current long-term plan. Once facility needs are broadly established, order-of-magnitude cost estimates for these improvements will be created. Whenever possible, material or cost estimates provided in existing planning

documents will be utilized.

It should be stressed that this task is focused on identifying facility needs for the unconstrained demand forecast and identifying a preliminary set of alternatives to meet this demand. The detailed analysis of these (and other) alternatives will be performed in Phase II of this System Plan.

Products: A Technical Paper, *Facility Assessment*, will be produced, which summarizes the work of the Task. A draft version of this Paper will be available to the public prior to a set of public briefings, as described in Task 10. A final version of the Paper will be produced incorporating or addressing public input.

Task 9: Phase II Scoping

Objective: A work scope for Phase II will be developed, based on the findings of previous tasks.

Approach: The approach to this Phase of the System Plan has been to develop a single forecast of potential activity for the region. This forecast will reflect an unconstrained condition, and will be based on a reasonable set of assumptions relative to regional development, airport access, and industry trends.

However, this forecast and the assumptions behind it may have policy implications for the New England States, municipalities, and other government entities. In some cases, changes to current policy may be required or desirable to achieve the forecast demand distribution. It is critical that these changes are identified, and the effects of these changes (or lack of changes) are assessed. This work element will be the key objective of Phase II of this study. In addition, the forecasts could have implications relative to facility needs, as defined in the airport master planning process.

Accordingly, a Phase II work scope (including a cost estimate) for the New England Regional Airport System Plan Update will be developed through close coordination with the Project Management Team.

Products: A *Draft Phase II Work Scope* will be developed for distribution and comment by the Project Management Team. Once this scope is approved, a draft FAA grant application will be prepared.

Task 10: Coordination and Documentation

Objective: The purpose of this task is to provide coordination and documentation efforts for the study.

Approach: The coordination and documentation effort for this study is outlined herein.

10.1 Coordination

The coordination process will consist of the following elements.

10.1.1 Project Management Team Coordination

The consultant will meet with the Project Management Team to report on study progress and to review work to be accomplished. Up to twelve meetings will be held. These meetings will generally be held at FAA New England Headquarters. A Project Notebook will be developed at the start of the project (Task 1) that will provide copies of the final work scope and schedule, contact names, and space for reports and memoranda. The consultant will prepare and distribute to the PMT a memorandum of each meeting, which summarizes meeting discussions and identifies action items.

10.1.2 Supplementary Coordination

The consultant will reserve up to six meetings for additional coordination with the Project Management Team, government officials, and regional or metropolitan planning organizations. During these meetings, the work accomplished to date will be reviewed and input and comments obtained.

10.1.3 State Coordination

The intergovernmental coordination process includes three meetings of the consultant with the New England Governor's Council, to brief officials on the status of the work and to present the draft report upon its completion.

10.1.4 Public Briefings

The consultant, in coordination with the PMT, will schedule general public briefings in each state. The purpose of the briefings will be to inform the general public as the goals and status of the study, and to respond to any questions related to the project. Briefings will be held during Tasks 2 and 8. The first set of briefings will be to provide an overview of the study and its goals; the second set will be to present the forecast analysis. Up to twelve briefings (two in each state) will be held.

10.1.5 Newsletters and Press Releases

A quarterly newsletter will be prepared for general distribution. The purpose of this newsletter will be to inform interested parties on the status and findings of the report. The newsletters will be produced in hardcopy, as well in an electronic format that can be posted to the project's public access website. Newsletters will be forwarded to the Project Management Team for distribution.

Upon request of the PMT, the consultant will prepare press releases for distribution. All press releases will be reviewed by the PMT prior to distribution.

10.1.6 Websites

A System Plan website will be developed. This public access website will be linked to the websites for the states, Fly New England, Massport, FAA (New England) and other Phase I Study airports. The website will include an overview of the study, monthly updates of the project and/or PMT meeting memoranda, the newsletter, and related material. If permitted by the PMT, Technical Papers or Reports accepted by the PMT might be available for downloading in PDF format. Public comments will be accepted on the site.

10.2 Documentation

Papers will be provided in hardcopy and in electronic formats (such as Adobe Acrobat). Use of electronic formats facilitates the posting of materials to web sites and in dissemination. As noted in the previous tasks, a series of *Technical Papers* will be produced at key points in the study. Up to fifty (50) copies of each Paper will be provided.

10.2.1 Draft Report

Upon completion of the Tasks, and the review and approval of Technical Papers by the Project Management Team, a consolidated Draft Phase I Report will be prepared to be provided to the Project Management Team for initial review. Up to fifty (50) copies of this report will be prepared.

10.2.2 Final Report and Executive Summary

A *Final Phase I Report* will be prepared that reflects all comments. This Report will be distributed to the Project Management Team. Up to one hundred (100) copies of the Final Report will be prepared, in hard copy or CD format.

An *Executive Summary* will be prepared designed for general circulation. This will be a professionally designed report in brochure format that presents study findings in an easily understandable manner. Up to five hundred (500) copies will be provided to the Project Management Team, in either hard copy or CD format.

Any non-proprietary models developed for this study will be provided to members of the Project Management Team upon their request.

Task 10A. Peer Review Meetings (optional Task)

Objective: The purpose of this optional Task is to provide for a series of peer review meetings during the Phase I Study. As noted in the Project Organization section, the peer review will include a series of nationally recognized aviation and transportation experts who will provide an independent review of the study analysis and findings.

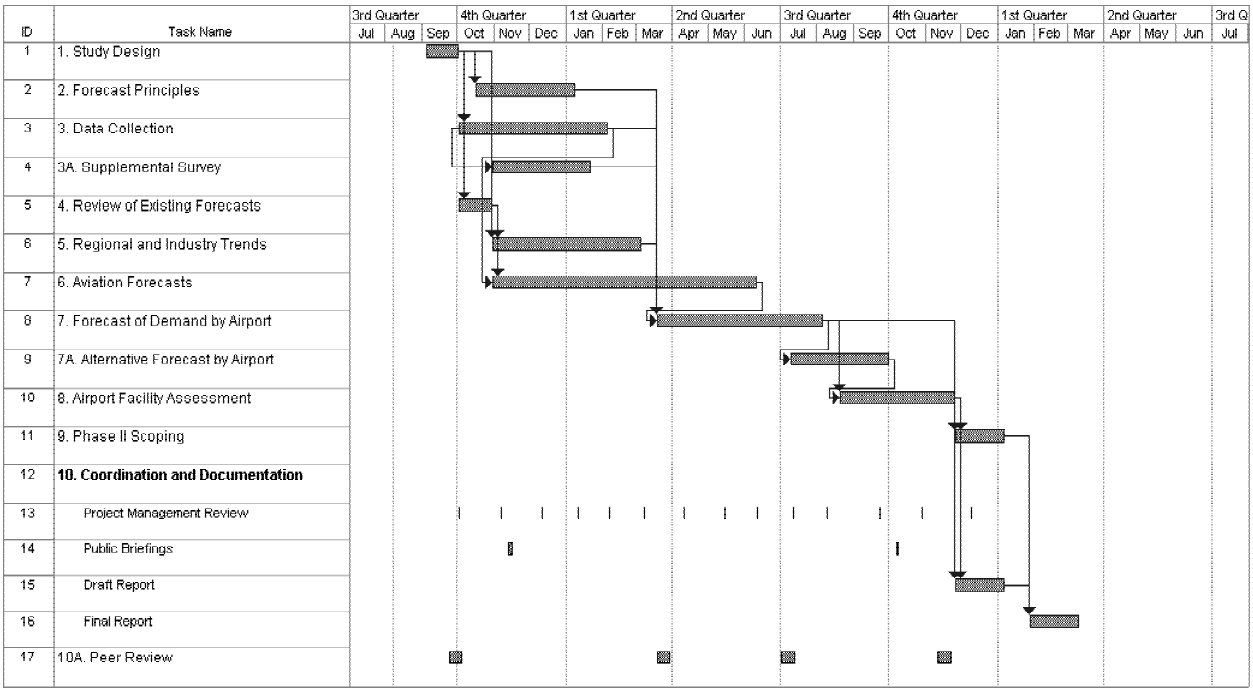
Approach: The PMT will identify up to six (6) persons with recognized credentials in aviation planning, transportation planning, or other relevant field. These persons could include experts from local universities (i.e. MIT, Harvard, etc.), as well as independent consultants. The PMT will use this group to review and assess work done during the study in a social, economic, and aviation context. The PMT may meet with these persons to discuss the project. Up to three (3) meetings may be scheduled.

Products: The products of this optional Task could include brief memoranda or White Papers that summarize the review of the Study.

Project Schedule

A fifteen-month project schedule is proposed, as shown below. This schedule is based on the following assumptions:

- The study design process will be completed in September.
- Any review of draft documents by the Project Management Team will be accomplished in two weeks (ten working days).
- No revisions of draft documents will be distributed; comments will be noted and incorporated into the draft final report.
- The Data Collection process can begin at once, and can overlap other tasks.
- Optional Tasks are shown as estimates only; the actual start time of these tasks could vary based on need of the client.
- Work on the Draft Phase I Report can begin concurrently with work on the Phase II Scope.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1 1. Study Design
2 2. Forecast Principles
3 3. Data Collection
4 3A. Supplemental Survey
5 4. Review of Existing Forecasts
6 5. Regional and Industry Trends
7 6. Aviation Forecasts
8 7. Forecast of Demand by Airport
9 7A. Alternative Forecast by Airport
10 8. Airport Facility Assessment
11 9. Phase II Scoping
12 10. Coordination and Documentation
13 Project Management Review
14 Public Briefings
15 Draft Report
16 Final Report
17 10A. Peer Review

This clearly is an aggressive calendar, given the complexity of the project. Based on the experience of our team, it is possible that the actual project schedule could extend beyond the schedule shown.

Appendix D
Capacity and Delay

- **D-1** Annual Operations at Logan
- **D-2** LAIPP-FLAPS Results
- **D-3** Takeoff and Landing Distance Assumptions-37.5M High RJ Fleet
- **D-4** Runway Configurations for the Alternatives
- **D-5** DELAYSIM Results for the 29M RJ Fleet Analysis
- **D-6** Adjusted Capacities for 29M Low and 37.5M High Fleets
- **D-7** DELAYSIM Results for the Wind Restriction Analysis, 29M Low Fleet
- **D-8** DELAYSIM Results for the Wind Restriction Analysis, 37.5M High RJ Fleet

Annual Operations at Logan
All Fleets

Aircraft Class	Code	Aircraft Type	1993	1998	29M Low	29M RJ	29M High	37.5M Low	37.5M High RJ	37.5M High	45M Low	45M High
Regional (<20)	BEC	Beechcraft All Series	68,143	56,913	37,009	29,529	46,261	64,215	18,110	70,982	49,930	67,362
Regional (<20)	J31	British Aerospace Jetstream 31	1,246	5,405	1,515	-	1,894	16,905	-	22,512	5,069	19,512
Regional (<20)	CNA	Cessna (Various)	6,846	18,895	9,207	21,746	11,509	2,482	6,747	3,368	612	2,894
Regional (<20)	D28	Dornier 228	38,522	-	6,210	-	7,763	-	-	-	-	-
Regional (<20)	SWM	Fairchild/Swearingen Metro	36,563	-	21,454	-	26,817	-	-	-	-	-
Regional (20-39)	J41	British Aerospace Jetstream 41	-	21,042	-	-	-	3,268	-	8,272	7,806	8,976
Regional (20-39)	DH8	De Havilland Dash 8-100	17,018	17,167	15,170	13,363	18,962	5,968	1,741	10,146	9,758	10,734
Regional (20-39)	D38	Dornier 328	-	-	-	-	-	19	-	520	473	590
Regional (20-39)	EM2	Embraer Brasilia	1,434	-	12,594	-	15,742	33	-	883	804	1,003
Regional (20-39)	SF3	SAAB 340	49,250	77,915	75,147	40,881	93,934	64,934	35,989	76,567	75,485	78,204
Regional (20-39)	SH6	Shorts 360	11,804	-	-	-	-	39	-	240	221	268
Regional (40+)	ATR	Aerospatiale ATR 42	8,940	4,927	3,870	-	4,838	25,551	63	25,295	31,889	37,154
Regional (40+)	AT7	Aerospatiale ATR 72	-	-	-	-	-	889	2,254	877	1,193	1,445
Regional (40+)	ATP	British Aerospace ATP	-	-	-	-	-	889	-	877	1,193	1,445
Regional (40+)	DH3	De Havilland Dash 8-300	-	-	-	-	-	889	-	877	1,193	1,445
Regional (40+)	D8H	De Havilland Dash 8-400	-	-	-	-	-	889	-	877	1,193	1,445
Regional (40+)	DH7	De Havillland Dash 7	2,926	-	4,625	-	5,781	-	-	-	-	-
Regional (40+)	F50	Fokker 50	-	-	-	-	-	889	-	877	1,193	1,445
Regional (40+)	F60	Fokker 60	-	-	-	-	-	889	-	877	1,193	1,445
Regional (40+)	250	IPTN N-250	-	-	-	-	-	889	-	877	1,193	1,445
Regional (40+)	S20	SAAB 2000	-	-	10,202	-	12,753	9,777	-	9,642	13,121	15,899
Regional (40+)	LOF	Lockheed L-188	472	-	-	-	-	-	-	-	-	-
Jet (<90)	328	Dornier 328JET	-	-	-	28,048	-	-	42,687	-	-	-
Jet (<90)	ER3	Embraer EMB-135	-	-	-	5,240	-	-	22,375	-	-	-
Jet (<90)	AR7	Avroliner RJ70	-	-	7,669	-	850	6,801	-	6,068	7,268	6,893
Jet (<90)	AR8	Avroliner RJ85	-	-	-	-	-	4,173	-	2,949	4,954	4,327
Jet (<90)	CRJ	Canadair Regional Jet CRJ-200	-	10,720	6,970	17,414	850	11,155	36,095	8,554	12,814	11,481
Jet (<90)	145	Embraer EMB-145	-	-	-	66,729	-	1,043	77,322	737	1,239	1,082
Jet (<90)	F28	Fokker 28	3,329	735	424	-	714	-	-	-	-	-
Jet (<90)	F70	Fokker 70	-	-	307	-	517	1,043	-	737	1,239	1,082
Jet (<90)	CR7	Canadair Regional Jet CRJ-700	-	-	-	-	-	-	2,365	-	-	-
Jet (<90)	728	Dornier 728JET	-	-	-	-	-	-	1,183	-	-	-
Jet (<90)	ER7	Embraer 170	-	-	-	-	-	-	2,365	-	-	-
Jet (90-120)	AR1	Avroliner RJ100	-	-	-	-	-	168	1,615	372	49	147
Jet (90-120)	112	BAC-111-2000	-	-	-	-	-	168	-	372	49	147
Jet (90-120)	717	Boeing 717	-	-	-	712	-	-	5,177	-	-	-
Jet (90-120)	337	Boeing 737 Stage 3	-	-	8,446	-	-	4,982	-	6,168	3,954	4,879
Jet (90-120)	735	Boeing 737-500	1,154	4,914	18,263	5,929	18,329	10,092	3,410	19,752	4,333	9,127
Jet (90-120)	736	Boeing 737-600	-	-	-	-	-	2,113	6,516	4,681	616	1,850
Jet (90-120)	RJ1	British Aerospace BAe 146-RJ100	7,138	359	2,208	-	3,718	168	-	372	49	147
Jet (90-120)	100	Fokker 100	6,489	12,374	3,342	4,778	3,354	11,428	631	19,498	6,287	10,599
Jet (90-120)	3D9	McDonnell Douglas DC9 Stage 3	-	-	7,973	6,100	8,001	5,416	-	7,709	3,797	5,198
Jet (90-120)	D9S	McDonnell Douglas DC9-30	29,793	25,530	817	-	820	-	-	-	-	-

Annual Operations at Logan
All Fleets

Aircraft Class	Code	Aircraft Type	1993	1998	29M Low	29M RJ	29M High	37.5M Low	37.5M High RJ	37.5M High	45M Low	45M High
Jet (90-120)	D95	McDonnell Douglas DC9-50	-	1,133	1,287	-	1,265	-	-	-	-	-
Jet (90-120)	M87	McDonnell Douglas MD-87	-	-	-	-	14,127	622	-	622	694	694
Jet (121-175)	319	Airbus A319	-	3,731	-	29,788	-	351	19,013	548	172	622
Jet (121-175)	320	Airbus A320	9,559	10,589	16,395	21,147	16,108	11,932	46,455	15,340	12,436	16,947
Jet (121-175)	727	Boeing 727-100	336	16	-	-	39	-	-	-	-	-
Jet (121-175)	723	Boeing 727-100 Stage 3	-	-	-	-	15,579	-	-	-	-	-
Jet (121-175)	372	Boeing 727-100/200 Stage 3	-	-	15,856	10,947	-	5,651	-	6,345	5,783	6,781
Jet (121-175)	72S	Boeing 727-200	44,497	32,745	3,138	-	3,083	-	-	-	-	-
Jet (121-175)	737	Boeing 737	330	1,509	307	-	9	-	-	-	-	-
Jet (121-175)	73S	Boeing 737-200	10,160	25,155	-	-	308	-	-	-	-	-
Jet (121-175)	73H	Boeing 737-200 Stage 3	-	-	-	16,368	8,467	-	9,089	-	-	-
Jet (121-175)	733	Boeing 737-300	24,007	16,787	19,986	23,790	19,636	37,964	4,155	42,877	39,101	45,379
Jet (121-175)	734	Boeing 737-400	7,049	6,282	9,578	5,897	9,410	13,271	2,854	14,906	13,512	15,862
Jet (121-175)	773	Boeing 737-700	-	-	1,876	2,135	1,843	88	35,284	137	43	155
Jet (121-175)	738	Boeing 737-800	-	-	-	25,213	-	334	47,502	520	163	590
Jet (121-175)	D1M	McDonnell Douglas DC10 Mixed	-	-	-	-	-	26	-	28	26	29
Jet (121-175)	M80	McDonnell Douglas MD-80/81/82/83	36,477	37,918	-	38,227	29,848	23,229	7,895	28,547	25,138	30,840
Jet (121-175)	M88	McDonnell Douglas MD-88	-	2,881	58,415	-	13,418	9,991	-	11,366	10,251	12,149
Jet (121-175)	M90	McDonnell Douglas MD-90	-	-	10,665	-	10,478	16,416	-	18,006	16,381	18,830
Jet (176-225)	D8P	McDonnell Douglas DC-8	15	-	-	-	-	-	-	-	-	-
Jet (176-225)	310	Airbus A310	954	357	570	175	601	1,890	506	1,927	1,621	1,665
Jet (176-225)	321	Airbus A321	-	-	11,186	-	11,798	-	12,521	-	-	-
Jet (176-225)	739	Boeing 737-900	-	-	-	-	-	-	3,679	-	-	-
Jet (176-225)	757	Boeing 757-200	29,846	40,648	43,105	45,686	45,465	61,082	27,578	55,048	79,468	81,955
Jet (176-225)	767	Boeing 767-200/200ER	3,684	4,889	3,842	4,117	4,052	6,689	5,993	5,970	8,740	9,070
Jet (225+)	AB3	Airbus A300	2,651	4,912	1,728	4,359	1,512	4,467	550	4,014	5,566	4,399
Jet (225+)	330	Airbus A330	-	936	2,265	3,672	1,982	9,890	8,229	8,721	10,859	8,476
Jet (225+)	340	Airbus A340	148	700	2,296	1,074	2,009	1,797	1,998	1,357	4,342	3,741
Jet (225+)	747	Boeing 747-100	-	2,231	380	-	249	-	-	-	-	-
Jet (225+)	74S	Boeing 747-200	2,362	-	-	-	672	-	-	-	-	-
Jet (225+)	743	Boeing 747-300	-	1,051	-	-	-	32	-	26	-	-
Jet (225+)	74D	Boeing 747-300/400 Combi	-	278	-	-	-	167	-	121	164	86
Jet (225+)	744	Boeing 747-400	706	510	2,871	3,780	559	7,669	808	6,398	11,071	9,160
Jet (225+)	763	Boeing 767-300/300ER	5,049	4,228	2,907	10,083	2,544	17,950	15,020	15,453	22,404	17,117
Jet (225+)	764	Boeing 767-400	-	-	-	-	-	-	4,820	-	-	-
Jet (225+)	777	Boeing 777	-	855	1,183	-	7,473	6,327	1,616	5,015	12,483	9,687
Jet (225+)	772	Boeing 777-200	-	-	-	-	-	-	4,508	-	-	-
Jet (225+)	773	Boeing 777-300	-	-	-	-	-	-	382	-	-	-
Jet (225+)	L10	Lockheed L1011	2,356	2,461	2,091	-	1,830	390	-	350	474	374
Jet (225+)	D10	McDonnell Douglas DC10	13,423	2,481	5,645	1,083	4,940	12	-	10	17	12
Jet (225+)	M11	McDonnell Douglas MD-11	354	48	790	-	691	8,662	986	7,478	10,722	8,183
Regional (Freighter)	BEF	Beechcraft All Series Freighter	-	-	-	659	-	432	-	608	432	608
Regional (Freighter)	F27	Fokker F-27	-	736	-	-	-	-	-	-	-	-

Annual Operations at Logan
All Fleets

Aircraft Class	Code	Aircraft Type	1993	1998	29M Low	29M RJ	29M High	37.5M Low	37.5M High RJ	37.5M High	45M Low	45M High
Regional (Freighter)	CNF	Cessna (Various) Freighter	-	-	-	-	-	432	-	608	432	608
Jet (Freighter)	LR3	Lear 35	416	372	-	850	-	-	619	-	-	-
Jet (Freighter)	ABF	Airbus A300/310 Freighter	-	1,053	756	858	756	2,590	3,387	3,650	2,590	3,650
Jet (Freighter)	33F	Airbus A330 Freighter	-	-	-	-	-	-	464	-	-	-
Jet (Freighter)	707	Boeing 707 Freighter	171	-	-	-	-	-	-	-	-	-
Jet (Freighter)	723	Boeing 727 Freighter Stage 3	-	2,680	1,302	3,309	1,342	863	3,194	1,217	863	1,217
Jet (Freighter)	72S	Boeing 727-100/200 Freighter	2,299	-	163	-	84	-	-	-	-	-
Jet (Freighter)	73F	Boeing 737 Freighter	-	1	-	114	-	-	-	-	-	-
Jet (Freighter)	747	Boeing 747-100 Freighter	-	8	9	-	9	-	-	-	-	-
Jet (Freighter)	74S	Boeing 747-200 Freighter	212	-	502	-	502	-	-	-	-	-
Jet (Freighter)	75F	Boeing 757-200 Freighter	2	138	1,807	515	1,807	2,590	1,369	3,650	2,590	3,650
Jet (Freighter)	76F	Boeing 767-300 Freighter	-	5	165	-	165	1,295	3,557	1,825	1,295	1,825
Jet (Freighter)	LIF	Lockheed L1011 Freighter	-	33	98	-	98	863	-	1,217	863	1,217
Jet (Freighter)	D1F	McDonnell Douglas DC10 Freighter	-	1,589	1,251	2,194	1,251	1,295	2,320	1,825	1,295	1,825
Jet (Freighter)	D83	McDonnell Douglas DC8 Freighter Stage 3	-	-	-	4,681	-	1,295	-	1,825	1,295	1,825
Jet (Freighter)	D85	McDonnell Douglas DC8-50 Freighter	-	3	17	-	17	-	-	-	-	-
Jet (Freighter)	D86	McDonnell Douglas DC8-60 Freighter	406	946	1,067	-	1,067	-	-	-	-	-
Jet (Freighter)	D87	McDonnell Douglas DC8-70 Freighter	2,243	2,306	4,834	-	4,834	-	-	-	-	-
Jet (Freighter)	D9F	McDonnell Douglas DC9 Freighter	385	674	508	-	508	432	-	608	432	608
Jet (Freighter)	M1F	McDonnell Douglas MD-11 Freighter	387	284	434	-	434	1,295	557	1,825	1,295	1,825
GA Non-Jet	GA1	Chieftain	12,602	9,218	11,528	8,383	11,528	8,750	14,370	8,750	8,750	8,750
GA Jet	GA5	Canadair Challenger	-	-	4,183	1,956	4,183	-	2,669	-	-	-
GA Jet	GA3	Citation III	-	6,668	-	978	-	5,038	1,334	5,038	5,038	5,038
GA Jet	GA4	HS 125	-	5,377	5,280	-	5,280	4,063	-	4,063	4,063	4,063
GA Jet	GA2	Lear 35	11,671	9,464	4,251	16,625	4,251	7,150	22,684	7,150	7,150	7,150
Regional Non-Jets			243,164	202,264	197,003	105,519	246,254	199,413	64,903	234,561	203,518	252,713
Regional Jets			3,329	11,455	15,370	117,430	2,930	24,216	184,391	19,046	27,513	24,864
Mainline Jets			238,537	248,506	259,407	265,058	264,217	281,433	278,794	310,055	310,766	334,896
Cargo			6,521	10,829	12,913	13,180	12,874	13,380	15,467	18,860	13,380	18,860
GA			24,273	30,727	25,242	27,942	25,242	25,000	41,057	25,000	25,000	25,000
Total - All Aircraft Types			515,824	503,781	509,936	529,129	551,518	543,441	584,612	607,521	580,176	656,333

Table D-2

LAIPP - FLAPS Results

		Baseline Operational Capacities			
Configuration	Weather	29M Low	29M RJ	37.5M RJ	37.5M High
401DV	VAPS	119	120	113	117
401DB	BVFR	117	103	95	114
402DC	CIR	66	67	67	65
402DL	ILSH	66	67	67	63
402D1	CAT1	66	67	67	63
403B2	CAT2	65	67	65	63
403B3	CAT3	61	58	58	60
404DV	VAPS	85	77	69	81
404DB	BVFR	85	77	69	81
405DC	CIR	65	56	50	63
405DL	ILSH	43	43	43	44
405D1	CAT1	43	43	43	44
406NV	VAPS	67	67	67	67
406NB	BVFR	65	67	66	63
406NC	CIR	65	67	66	63
406NL	ILSH	65	65	61	63
406N1	CAT1	65	65	61	63
406N2	CAT2	65	65	61	63
407B2	CAT2	43	43	43	43
407B3	CAT3	43	40	40	43
408BV	VAPS	47	47	47	47
408BB	BVFR	47	47	47	47
408BC	CIR	47	47	47	47
409NV	VAPS	106	99	104	103
409NB	BVFR	106	86	79	102
410DL	ILSH	66	66	67	63
410D1	CAT1	66	66	67	63
411BL	ILSH	65	64	67	63
411B1	CAT1	65	64	67	63
411B2	CAT2	65	64	67	63
411B3	CAT3	65	58	59	63

		Baseline Operational Capacities			
Configuration	Weather	29M Low	29M RJ	37.5M RJ	37.5M High
201BV-D	VAPS	104	102	95	97
201BV-W	VAPS	104	99	89	96
201BB-D	BVFR	103	102	95	95
201BB-W	BVFR	103	98	89	95
202BC	CIR	65	65	65	64
202BL	ILSH	65	65	64	64
202B1	CAT1	65	65	64	64
202NV	VAPS	67	67	67	65
202NB	BVFR	65	65	65	64
203DV	VAPS	77	77	72	72
203DB	BVFR	76	74	72	71
204BV-D	VAPS	56	55	56	53
204BV-W	VAPS	54	55	56	52
204BB-D	BVFR	55	54	56	53
204BB-W	BVFR	54	54	53	52
205BV-D	VAPS	54	41	41	50
205BV-W	VAPS	41	41	40	40
205BB-D	BVFR	54	41	41	50
205BB-W	BVFR	41	40	40	40

Table D-2

LAIPP - FLAPS Results

		Baseline Operational Capacities			
Configuration	Weather	29M Low	29M RJ	37.5M RJ	37.5M High
301BV	VAPS	69	68	68	65
301BB	BVFR	69	67	66	65
302BC	CIR	47	45	45	47
302B1	CAT1	45	41	43	43
302B3	CAT3	43	41	41	41
303BV	VAPS	50	49	47	49
303BB	BVFR	50	48	47	48
304DS	CRDA	76	59	55	73
305BV	VAPS	52	52	50	52
305BB	BVFR	52	51	50	50
305BC	CIR	52	50	50	50
305B1	CAT1	32	45	32	32

		Baseline Operational Capacities			
Configuration	Weather	29M Low	29M RJ	37.5M RJ	37.5M High
501BV-D	VAPS	86	78	74	78
501BV-W	VAPS	61	59	59	59
502BB-D	BVFR	65	67	67	63
502BB-W	BVFR	65	58	59	63
502BC	CIR	56	59	58	55
502BL	ILSH	47	49	49	47
502B1	CAT1	47	49	49	47
502B3	CAT3	45	46	46	47
503BV	VAPS	54	55	53	52
503BB	BVFR	54	54	52	50
504BL	ILSH	47	47	47	45
504B1	CAT1	47	47	47	45
504B3	CAT3	45	43	43	43

		Baseline Operational Capacities			
Configuration	Weather	29M Low	29M RJ	37.5M RJ	37.5M High
001BV	VAPS	56	54	54	54
001BB	BVFR	54	54	53	54
001BC	CIR	54	52	50	52
001BL	ILSH	52	50	50	50
001B1	CAT1	52	50	50	50
002DV	VAPS	70	62	59	72
003BV	VAPS	56	56	55	54
003BB	BVFR	56	56	55	54
003BC	CIR	54	54	52	54
003BL	ILSH	52	52	50	52
003B1	CAT1	52	52	50	52
004NV	VAPS	29	29	27	27
004NB	BVFR	27	29	27	27

Table D-2

LAIPP - FLAPS Results

		5,000' Runway 14/32 Operational Capacities			
Configuration	Weather	29M Low	29M RJ	37.5M RJ	37.5M High
326BV	VAPS	121	114	106	115
326BB	BVFR	119	114	106	113
327BC	CIR	61	58	53	59
327B1	CAT1	58	56	50	56
328BV	VAPS	65	61	60	62
328BB	BVFR	63	62	59	63
329DV-D	VAPS	72	60	54	68
329DV-W	VAPS	72	56	51	68
329DB-D	BVFR	72	59	54	68
329DB-W	BVFR	72	56	50	68
3210DV	VAPS	95	75	68	89
3210DB	BVFR	94	75	68	89
3212BV	VAPS	99	93	86	94
3212BB	BVFR	99	93	86	92

		5,000' Runway 14/32 Operational Capacities			
Configuration	Weather	29M Low	29M RJ	37.5M RJ	37.5M High
146BV-D	VAPS	101	94	94	98
146BV-W	VAPS	75	74	75	74
147BB-D	BVFR	99	90	91	95
147BB-W	BVFR	74	71	73	75
148BC	CIRC	64	67	66	64
148BL	ILSH	65	65	66	63
148B1	CAT1	65	65	66	63
148B3	CAT3	53	53	52	52
149BV	VAPS	54	53	51	52
1410BB	BVFR	50	50	50	49
1410BC	CIRC	50	50	50	49
1410BL	ILSH	49	49	49	49
1410B1	CAT1	49	49	49	49
1410B3	CAT3	43	43	43	43

Notes:

All capacities presented reflect assumptions in Appendix C of the Supplemental DEIS/FEIR.

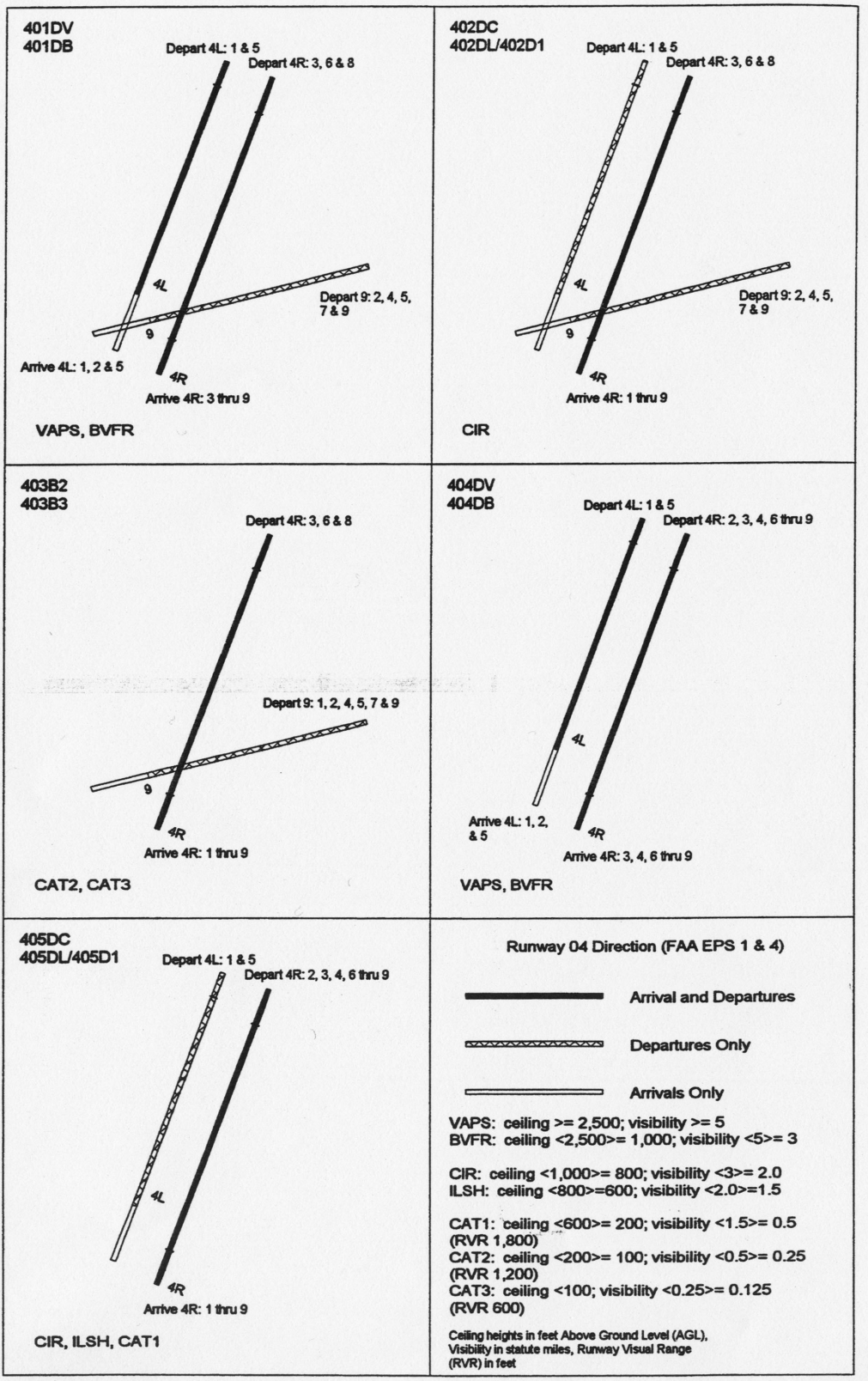
29M Low and 37.5M High Runway 14/32 capacities updated as described in FTA Memo of August 24, 2001.

Table D-3

Takeoff and Landing Distance Assumptions - 37.5M High RJ Fleet

Aircraft Class	Code	Aircraft Type	Annual Operations	Landing Distance		Takeoff Distance Distribution						
				Dry	Wet	0-499 nm	500-999 nm	1000-1499 nm	1500-2499 nm	2500-3499 nm	3500-4499 nm	4500 + nm
Regional (<20)	BEC	Beechcraft All Series	18,110	2,450	2,450	3,800	-	-	-	-	-	-
Regional (<20)	CNA	Cessna (Various)	6,747	2,485	2,485	2,195	-	-	-	-	-	-
Regional (20-39	DH8	De Havilland Dash 8-100	1,741	2,580	2,580	3,100	-	-	-	-	-	-
Regional (20-39	SF3	SAAB 340	35,989	3,258	3,258	3,830	-	-	-	-	-	-
Regional (40+)	ATR	Aerospatiale ATR 42	63	3,674	3,674	3,953	-	-	-	-	-	-
Regional (40+)	AT7	Aerospatiale ATR 72	2,254	3,963	3,963	4,625	-	-	-	-	-	-
Jet (<90)	328	Dornier 328JET	42,687	4,284	4,284	4,129	4,530	-	-	-	-	-
Jet (<90)	ER3	Embraer EMB-135	22,375	4,200	5,050	5,170	5,577	-	-	-	-	-
Jet (<90)	CRJ	Canadair Regional Jet CRJ-200	36,095	5,050	5,050	5,200	5,800	-	-	-	-	-
Jet (<90)	145	Embraer EMB-145	77,322	4,413	5,050	6,289	6,900	-	-	-	-	-
Jet (<90)	CR7	Canadair Regional Jet CRJ-700	2,365	5,050	5,050	5,050	5,130	-	-	-	-	-
Jet (<90)	728	Dornier 728JET	1,183	5,050	5,050	5,050	5,050	-	-	-	-	-
Jet (<90)	ER7	Embraer 170	2,365	5,050	5,050	5,013	5,500	-	-	-	-	-
Jet (90-120)	AR1	Avroliner RJ100	1,615	5,050	5,050	5,050	5,206	5,629	-	-	-	-
Jet (90-120)	717	Boeing 717	5,177	5,060	5,060	5,050	5,050	5,900	-	-	-	-
Jet (90-120)	735	Boeing 737-500	3,410	5,050	5,050	5,050	5,154	5,469	6,100	-	-	-
Jet (90-120)	736	Boeing 737-600	6,516	5,050	5,050	5,431	5,553	5,674	5,917	6,160	-	-
Jet (90-120)	100	Fokker 100	631	5,050	5,050	5,050	5,050	5,643	-	-	-	-
Jet (121-175)	319	Airbus A319	19,013	5,050	5,050	5,050	5,050	5,050	5,617	6,300	-	-
Jet (121-175)	320	Airbus A320	46,455	5,050	5,050	5,050	5,350	5,700	6,400	7,100	-	-
Jet (121-175)	73H	Boeing 737-200 Stage 3	9,089	5,050	5,050	5,050	5,354	5,789	6,660	-	-	-
Jet (121-175)	733	Boeing 737-300	4,155	5,050	5,050	5,050	5,354	5,789	6,660	-	-	-
Jet (121-175)	734	Boeing 737-400	2,854	5,050	5,050	5,178	5,816	6,454	7,730	-	-	-
Jet (121-175)	773	Boeing 737-700	35,284	5,050	5,050	5,050	5,148	5,459	6,079	6,700	-	-
Jet (121-175)	738	Boeing 737-800	47,502	5,350	5,350	5,298	5,682	6,065	6,833	7,600	-	-
Jet (121-175)	M80	McDonnell Douglas MD-80/81/82/8	7,895	5,800	5,800	5,179	5,909	6,640	8,100	-	-	-
Jet (176-225)	310	Airbus A310	506	5,050	5,050	5,050	5,050	5,050	5,480	6,120	6,760	7,400
Jet (176-225)	321	Airbus A321	12,521	5,300	5,300	5,050	5,630	6,260	7,520	8,780	-	-
Jet (176-225)	739	Boeing 737-900	3,679	5,600	5,600	5,298	5,782	6,265	7,233	8,200	-	-
Jet (176-225)	757	Boeing 757-200	27,578	5,100	5,100	5,050	5,050	5,050	5,899	6,850	7,800	-
Jet (176-225)	767	Boeing 767-200/200ER	5,993	5,050	5,050	5,050	5,050	5,128	5,585	6,043	6,500	-
Jet (225+)	AB3	Airbus A300	550	5,800	5,800	5,179	5,909	6,640	8,100	-	-	-
Jet (225+)	330	Airbus A330	8,229	5,640	5,640	6,100	6,326	6,552	7,004	7,456	7,908	8,360
Jet (225+)	340	Airbus A340	1,998	6,378	6,378	6,200	6,630	7,060	7,921	8,781	9,642	10,502
Jet (225+)	744	Boeing 747-400	808	7,150	7,150	6,099	6,469	6,839	7,579	8,320	9,060	9,800
Jet (225+)	763	Boeing 767-300/300ER	15,020	5,400	5,400	5,050	5,286	5,803	6,835	7,868	8,900	-
Jet (225+)	764	Boeing 767-400	4,820	5,800	5,800	5,050	5,403	6,036	7,302	8,568	9,834	11,100
Jet (225+)	777	Boeing 777	1,616	5,100	5,100	5,050	5,050	5,378	6,146	6,914	7,682	8,450
Jet (225+)	772	Boeing 777-200	4,508	5,100	5,100	5,050	5,050	5,378	6,146	6,914	7,682	8,450
Jet (225+)	773	Boeing 777-300	382	6,100	6,100	5,050	5,359	6,108	7,606	9,104	10,602	12,100
Jet (225+)	M11	McDonnell Douglas MD-11	986	7,100	7,100	7,436	7,692	7,949	8,462	8,974	9,487	10,000
Jet (Freighter)	LR3	Lear 35	619	3,075	3,075	4,972	-	-	-	-	-	-
Jet (Freighter)	ABF	Airbus A300/310 Freighter	3,387	5,050	5,050	5,050	5,050	5,267	6,333	7,400	-	-
Jet (Freighter)	33F	Airbus A330 Freighter	464	5,873	5,873	6,100	6,420	6,740	7,380	8,020	8,660	-
Jet (Freighter)	723	Boeing 727 Freighter Stage 3	3,194	5,300	5,300	6,080	7,287	8,494	10,909	-	-	-
Jet (Freighter)	75F	Boeing 757-200 Freighter	1,369	5,060	5,060	5,050	5,050	5,239	6,519	7,800	-	-
Jet (Freighter)	76F	Boeing 767-300 Freighter	3,557	5,300	5,300	5,050	5,421	6,257	7,928	9,600	-	-
Jet (Freighter)	D1F	McDonnell Douglas DC10 Freighte	2,320	6,320	6,320	5,838	6,648	7,459	9,079	10,700	-	-
Jet (Freighter)	M1F	McDonnell Douglas MD-11 Freight	557	7,600	7,600	7,628	7,925	8,221	8,814	9,407	10,000	-
GA Non-Jet	GA1	Chieftain	14,370	1,880	1,880	2,510	-	-	-	-	-	-
GA Jet	GA5	Canadair Challenger	2,669	3,050	3,050	5,700	-	-	-	-	-	-
GA Jet	GA3	Citation III	1,334	2,900	2,900	5,030	-	-	-	-	-	-
GA Jet	GA2	Lear 35	22,684	3,075	3,075	4,972	-	-	-	-	-	-
Total - All Aircraft Types			584,612									

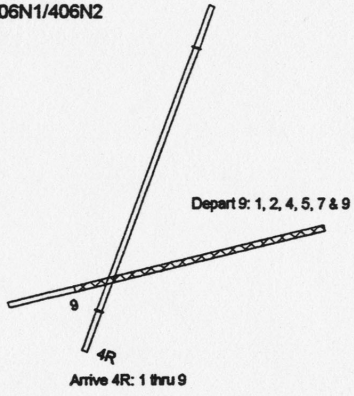
Takeoff and Landing Distances compiled from Airport Planning Manuals from manufacturers, Aviation Week and Space Technology Source Book, and Aicraft Blue Book Price Diges
Takeoff Distance = FAR Takeoff Distance over 50 ft obstacle at ISA + 15 (at MTOW and at min)
Landing Distance = FAR Landing Distance (Actual / 0.6) at MLW
Assumed most common engine type when necessary
Distances by stage length interpolated between min and max takeoff distances.
Manual adjustments to 5,050 to ensure aircraft larger than 50-seat RJs did not use 5,000 foot runway.
Assumptions reflect Jim Muldoon analysis (i.e. separate dry/wet landing distances for Embraer RJs).


401DV
401DB
Depart 4L: 1 & 5
Depart 4R: 3, 6 & 8
4L
Depart 9: 2, 4, 5, 7 & 9
9
Arrive 4L: 1, 2 & 5
4R
Arrive 4R: 3 thru 9
VAPS, BVFR
402DC
402DL/402D1
Depart 4L: 1 & 5
Depart 4R: 3, 6 & 8
4L
Depart 9: 2, 4, 5, 7 & 9
9
4R
Arrive 4R: 1 thru 9
CIR
403B2
403B3
Depart 4R: 3, 6 & 8
Depart 9: 1, 2, 4, 5, 7 & 9
9
4R
Arrive 4R: 1 thru 9
CAT2, CAT3
404DV
404DB
Depart 4L: 1 & 5
Depart 4R: 2, 3, 4, 6 thru 9
4L
Arrive 4L: 1, 2, & 5
4R
Arrive 4R: 3, 4, 6 thru 9
VAPS, BVFR
405DC
405DL/405D1
Depart 4L: 1 & 5
Depart 4R: 2, 3, 4, 6 thru 9
4L
4R
Arrive 4R: 1 thru 9
CIR, ILSH, CAT1
Runway 04 Direction (FAA EPS 1 & 4)
Arrival and Departures
Departures Only
Arrivals Only
VAPS: ceiling >= 2,500; visibility >= 5
BVFR: ceiling <2,500>= 1,000; visibility <5>= 3
CIR: ceiling <1,000>= 800; visibility <3>= 2.0
ILSH: ceiling <800>=600; visibility <2.0>=1.5
CAT1: ceiling <600>= 200; visibility <1.5>= 0.5 (RVR 1,800)
CAT2: ceiling <200>= 100; visibility <0.5>= 0.25 (RVR 1,200)
CAT3: ceiling <100; visibility <0.25>= 0.125 (RVR 600)
Ceiling heights in feet Above Ground Level (AGL), Visibility in statute miles, Runway Visual Range (RVR) in feet

Runway Configurations

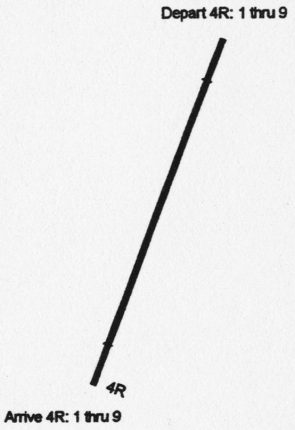
Table D-4

406NV
406NB
406NC
406NL/406N1/406N2



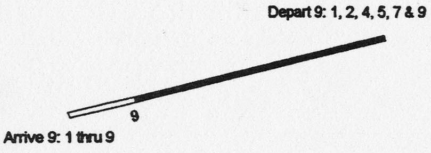
VAPS, BVFR, CIR, ILSH, CAT1, CAT2

407B2
407B3



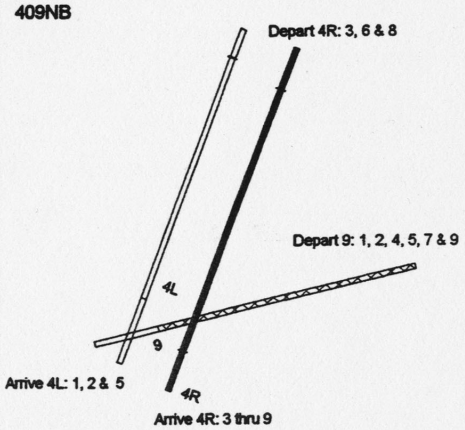
CAT2, CAT3

408BV
408BB
408BC



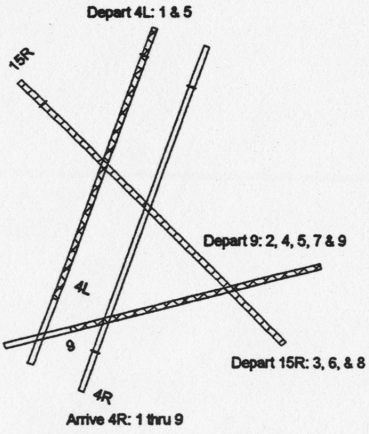
VAPS, BVFR, CIR

409NV
409NB



VAPS, BVFR

410DL/410D1



ILSH, CAT1

Runway 04 Direction (FAA EPS 1 & 7)

Arrival and Departures

Departures Only

Arrivals Only

VAPS: ceiling >= 2,500; visibility >= 5
BVFR: ceiling <2,500>= 1,000; visibility <5>= 3

CIR: ceiling <1,000>= 800; visibility <3>= 2.0
ILSH: ceiling <800>=600; visibility <2.0>=1.5

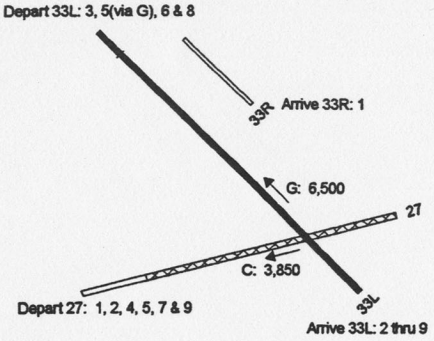
CAT1: ceiling <600>= 200; visibility <1.5>= 0.5 (RVR 1,800)
CAT2: ceiling <200>= 100; visibility <0.5>= 0.25 (RVR 1,200)
CAT3: ceiling <100; visibility <0.25>= 0.125 (RVR 600)

Ceiling heights in feet Above Ground Level (AGL), Visibility in statute miles, Runway Visual Range (RVR) in feet

Runway Configurations (Cont.)

Table D-4

301BV
301BB



VAPS, BVFR

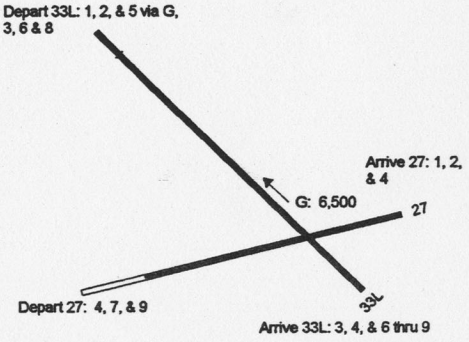
302BC
302B1

CIR, CAT1

303BV
303BB

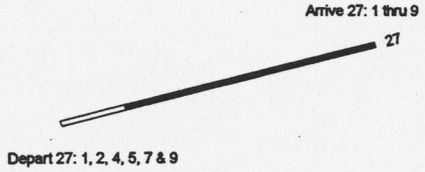
VAPS, BVFR

304DS



CRDA

305BV
305BB
305BC
305B1



VAPS, BVFR, CIR (Dep. 900-1), CAT 1 (500-1.5)

Runway 33 Direction (FAA EPS 3 & 7)

Arrival and Departures

Departures Only

Arrivals Only

VAPS: ceiling >= 2,500; visibility >= 5

BVFR: ceiling <2,500>= 1,000; visibility <5>= 3

CRDA: ceiling <1,000>= 800; visibility <3>= 2

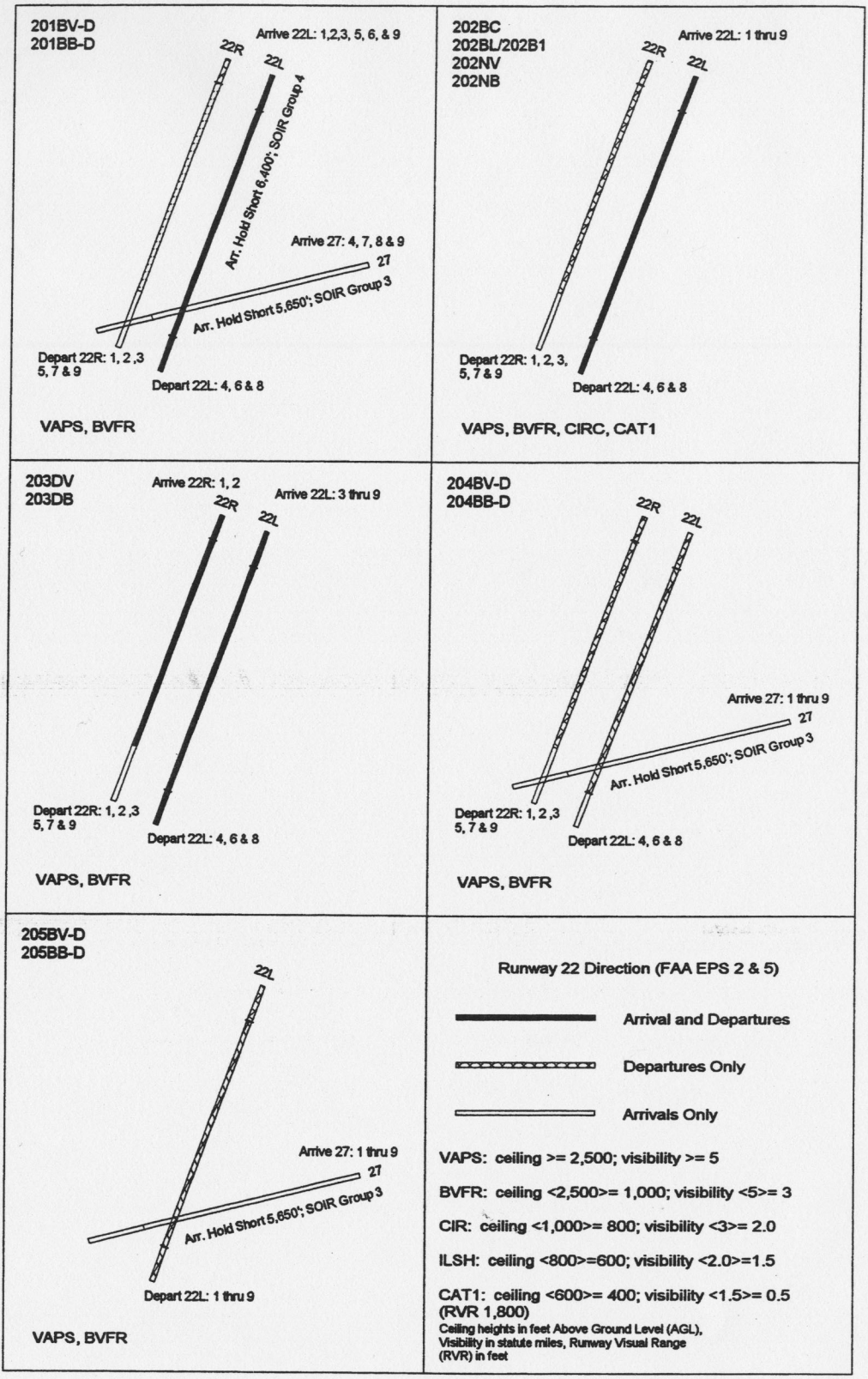
CIR: ceiling <1,000>= 600; visibility <3>= 1.5

CAT1: ceiling <600>= 200; visibility <1.5>= 0.5 (RVR 1,800)

Ceiling heights in feet Above Ground Level (AGL), Visibility in statute miles, Runway Visual Range (RVR) in feet

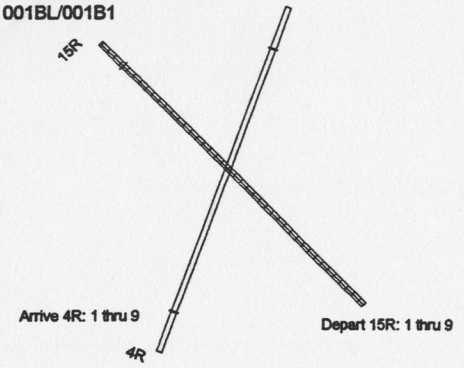
Runway Configurations (Cont.)

Table D-4


201BV-D
201BB-D
Arrive 22L: 1,2,3, 5, 6, & 9
22R
22L
Arr. Hold Short 6,400'; SOIR Group 4
Arrive 27: 4, 7, 8 & 9
27
Arr. Hold Short 5,650'; SOIR Group 3
Depart 22R: 1, 2 ,3 5, 7 & 9
Depart 22L: 4, 6 & 8
VAPS, BVFR
202BC
202BL/202B1
202NV
202NB
Arrive 22L: 1 thru 9
22R
22L
Depart 22R: 1, 2, 3, 5, 7 & 9
Depart 22L: 4, 6 & 8
VAPS, BVFR, CIRC, CAT1
203DV
203DB
Arrive 22R: 1, 2
Arrive 22L: 3 thru 9
22R
22L
Depart 22R: 1, 2 ,3 5, 7 & 9
Depart 22L: 4, 6 & 8
VAPS, BVFR
204BV-D
204BB-D
22R
22L
Arrive 27: 1 thru 9
27
Arr. Hold Short 5,650'; SOIR Group 3
Depart 22R: 1, 2 ,3 5, 7 & 9
Depart 22L: 4, 6 & 8
VAPS, BVFR
205BV-D
205BB-D
22L
Arrive 27: 1 thru 9
27
Arr. Hold Short 5,650'; SOIR Group 3
Depart 22L: 1 thru 9
VAPS, BVFR
Runway 22 Direction (FAA EPS 2 & 5)
Arrival and Departures
Departures Only
Arrivals Only
VAPS: ceiling >= 2,500; visibility >= 5
BVFR: ceiling <2,500>= 1,000; visibility <5>= 3
CIR: ceiling <1,000>= 800; visibility <3>= 2.0
ILSH: ceiling <800>=600; visibility <2.0>=1.5
CAT1: ceiling <600>= 400; visibility <1.5>= 0.5 (RVR 1,800)
Ceiling heights in feet Above Ground Level (AGL), Visibility in statute miles, Runway Visual Range (RVR) in feet

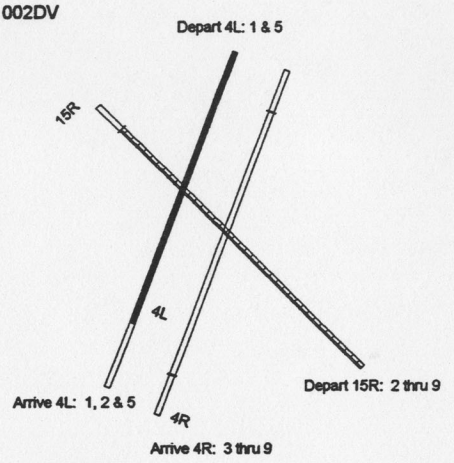
Runway Configurations (Cont.)

001BV
001BB
001BC
001BL/001B1



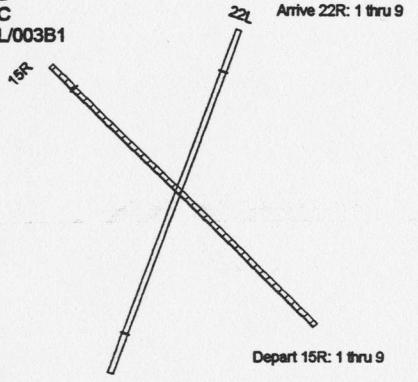
VAPS, BVFR, CIR, ILSH, CAT1

002DV



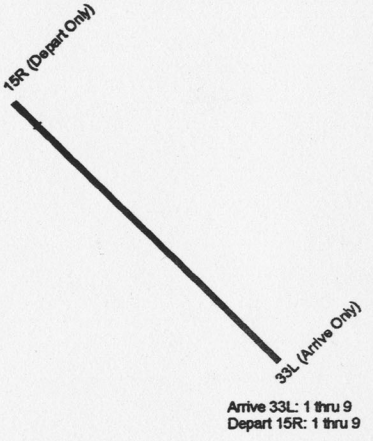
VAPS, BVFR

003BV
003BB
003BC
003BL/003B1



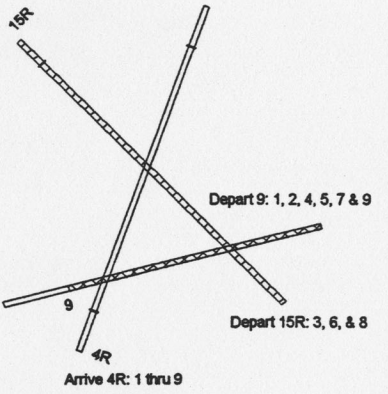
VAPS, BVFR, CIR, ILSH, CAT1

004NV
004NB



VAPS, BVFR

411BL/411B1/411B2
411B3



ILSH, CAT1, CAT2, CAT3

"Noise Relief" Configurations (No FAA EPS)

Arrival and Departures

Departures Only

Arrivals Only

VAPS: ceiling >= 2,500; visibility >= 5
BVFR: ceiling <2,500>= 1,000; visibility <5>= 3

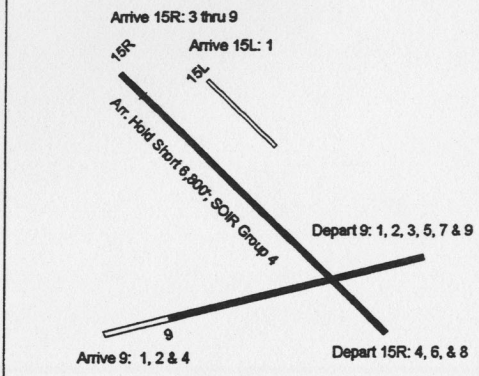
CIR: ceiling <1,000>= 800; visibility <3>= 2.0
ILSH: ceiling <800>=600; visibility <2.0>=1.5

CAT1: ceiling <600>= 200; visibility <1.5>= 0.5 (RVR 1,800)
CAT2: ceiling <200>= 100; visibility <0.5>= 0.25 (RVR 1,200)
CAT3: ceiling <100; visibility <0.25>= 0.125 (RVR 600)

Ceiling heights in feet Above Ground Level (AGL),
Visibility in statute miles, Runway Visual Range (RVR) in feet

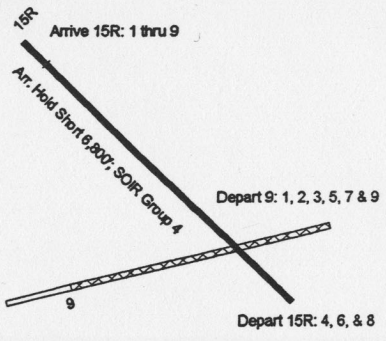
Runway Configurations (Cont.)

501BV-D



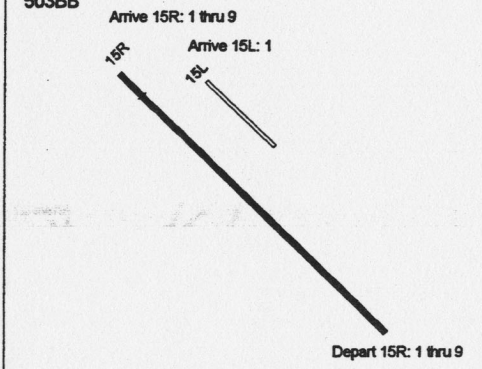
VAPS

502BB-D
502BC
502BL/502B1



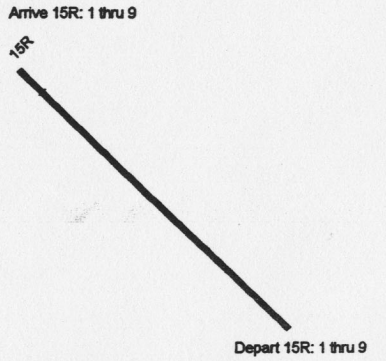
BVFR, CIRC (No HS), CAT1 (No HS)

503BV
503BB



VAPS, BVFR

504BL/504B1



CAT 1

Runway 15 Direction (FAA EPS 6 & 7)

Arrival and Departures

Departures Only

Arrivals Only

VAPS: ceiling >= 2,500; visibility >= 5

BVFR: ceiling <2,500>= 1,000; visibility <5>= 3

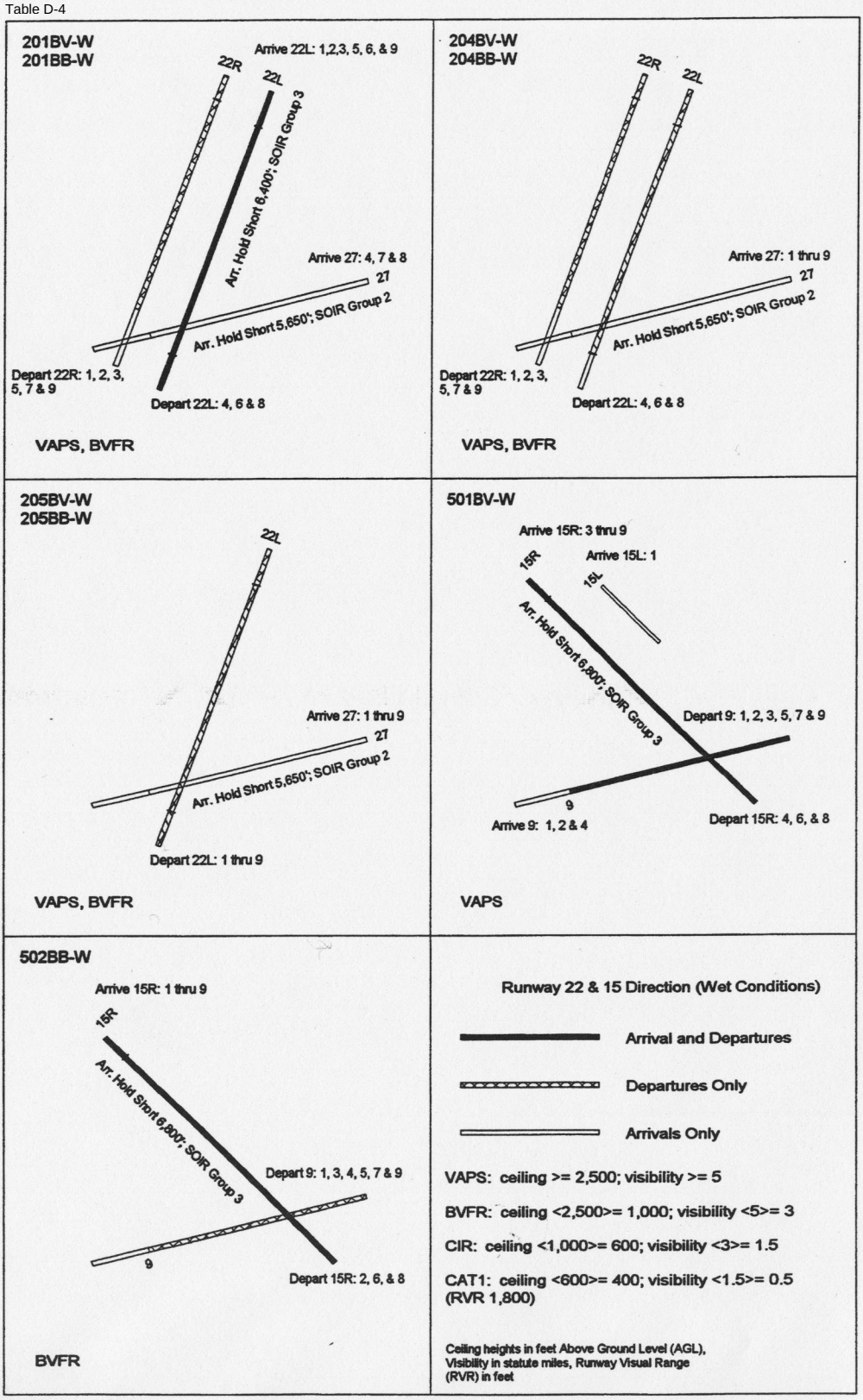
CIR: ceiling <1,000>= 800; visibility <3>= 2.0

ILSH: ceiling <800>=600; visibility <2.0>=1.5

CAT1: ceiling <600>= 300; visibility <1.5>= 0.5 (RVR 1,800)

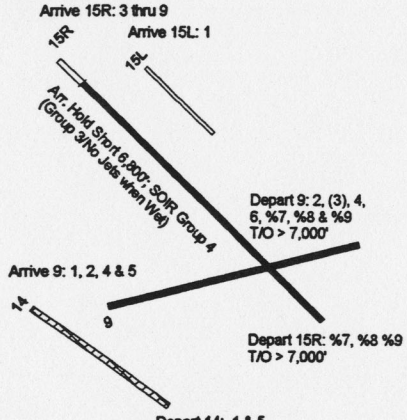
Ceiling heights in feet Above Ground Level (AGL), Visibility in statute miles, Runway Visual Range (RVR) in feet

Runway Configurations (Cont.)


201BV-W
201BB-W
Arrive 22L: 1,2,3, 5, 6, & 9
22R
22L
Arr. Hold Short 6,400'; SOIR Group 3
Arrive 27: 4, 7 & 8
27
Arr. Hold Short 5,650'; SOIR Group 2
Depart 22R: 1, 2, 3, 5, 7 & 9
Depart 22L: 4, 6 & 8
VAPS, BVFR
204BV-W
204BB-W
22R
22L
Arrive 27: 1 thru 9
27
Arr. Hold Short 5,650'; SOIR Group 2
Depart 22R: 1, 2, 3, 5, 7 & 9
Depart 22L: 4, 6 & 8
VAPS, BVFR
205BV-W
205BB-W
22L
Arrive 27: 1 thru 9
27
Arr. Hold Short 5,650'; SOIR Group 2
Depart 22L: 1 thru 9
VAPS, BVFR
501BV-W
Arrive 15R: 3 thru 9
15R
Arrive 15L: 1
15L
Arr. Hold Short 6,800'; SOIR Group 3
Depart 9: 1, 2, 3, 5, 7 & 9
9
Arrive 9: 1, 2 & 4
Depart 15R: 4, 6, & 8
VAPS
502BB-W
Arrive 15R: 1 thru 9
15R
Arr. Hold Short 6,800'; SOIR Group 3
Depart 9: 1, 3, 4, 5, 7 & 9
9
Depart 15R: 2, 6, & 8
BVFR
Runway 22 & 15 Direction (Wet Conditions)
Arrival and Departures
Departures Only
Arrivals Only
VAPS: ceiling >= 2,500; visibility >= 5
BVFR: ceiling <2,500>= 1,000; visibility <5>= 3
CIR: ceiling <1,000>= 600; visibility <3>= 1.5
CAT1: ceiling <600>= 400; visibility <1.5>= 0.5 (RVR 1,800)
Ceiling heights in feet Above Ground Level (AGL), Visibility in statute miles, Runway Visual Range (RVR) in feet

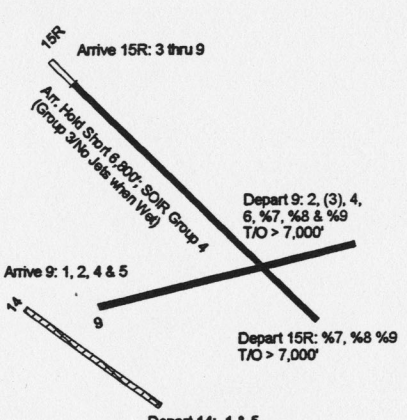
Runway Configurations (Cont.)

141BV-D/W
(146BV-D/W)


Arrive 15R: 3 thru 9
15R
Arrive 15L: 1
15L
Arr. Hold Short 6,800': SOIR Group 4 (Group 3/No Jets when Wet)
Depart 9: 2, (3), 4, 6, %7, %8 & %9 T/O > 7,000'
Arrive 9: 1, 2, 4 & 5
14
9
Depart 15R: %7, %8 %9 T/O > 7,000'
Depart 14: 1 & 5 (3, %7 T/O < CMTR)

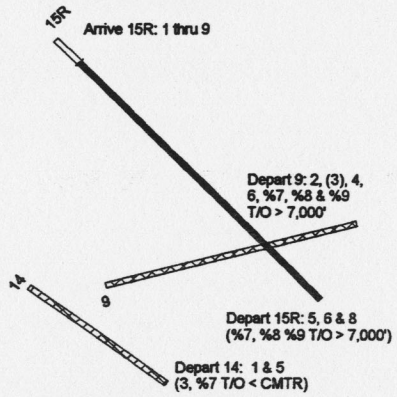
VAPS

142BB-D/W
(147BB-D/W)


15R
Arrive 15R: 3 thru 9
Arr. Hold Short 6,800': SOIR Group 4 (Group 3/No Jets when Wet)
Depart 9: 2, (3), 4, 6, %7, %8 & %9 T/O > 7,000'
Arrive 9: 1, 2, 4 & 5
14
9
Depart 15R: %7, %8 %9 T/O > 7,000'
Depart 14: 1 & 5 (3, %7 T/O < CMTR)

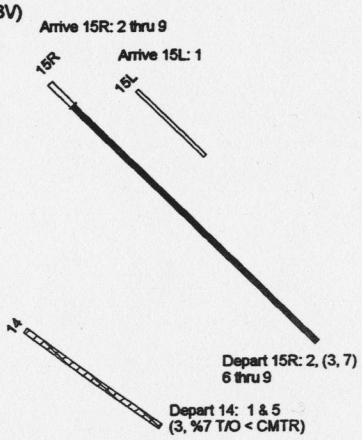
BVFR

143BC (148BC)
143BL/143B1 (148BL/148B1)



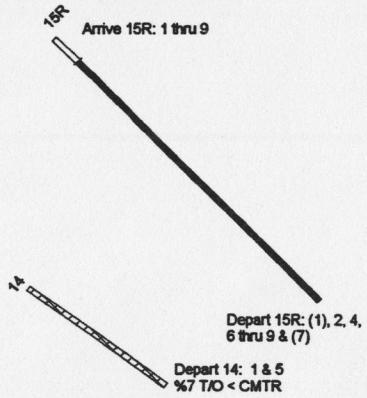
CIRC, ILSH, CAT1 - (No HS)

144BV
(149BV)



VAPS, BVFR

145BB (1410BB)
145BC (1410BC)
145BL/145B1 (1410BL/1410B1)



BVFR, CIR, ILSH, CAT 1

Runway 14 Direction

Arrival and Departures

Departures Only

Arrivals Only

VAPS: ceiling >= 2,500; visibility >= 5

BVFR: ceiling <2,500>= 1,000; visibility <5>= 3

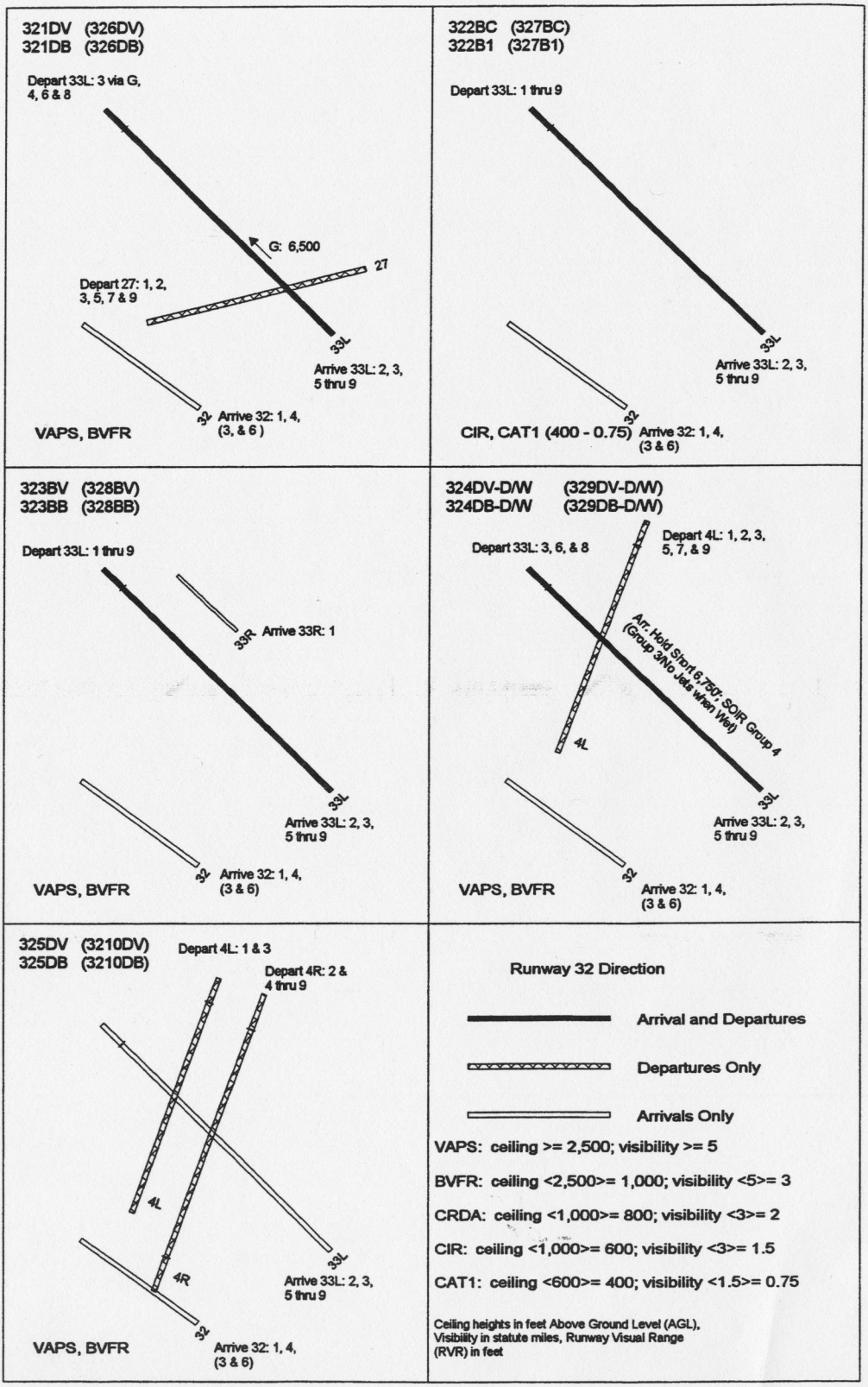
CIR: ceiling <1,000>= 800; visibility <3>= 2.0

ILSH: ceiling <800>=600; visibility <2.0>=1.5

CAT1: ceiling <600>= 300; visibility <1.5>= 0.5 (RVR 1,800)

Ceiling heights in feet Above Ground Level (AGL), Visibility in statute miles, Runway Visual Range (RVR) in feet

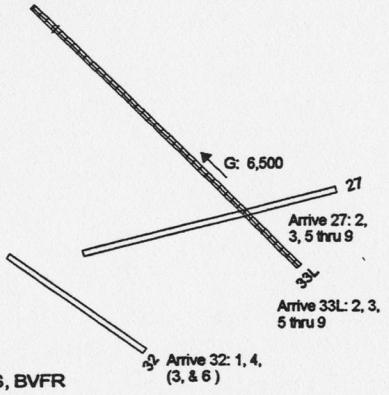
Runway Configurations (Cont.)


321DV (326DV)
321DB (326DB)
Depart 33L: 3 via G, 4, 6 & 8
G: 6,500
27
Depart 27: 1, 2, 3, 5, 7 & 9
33L
Arrive 33L: 2, 3, 5 thru 9
32
Arrive 32: 1, 4, (3, & 6)
VAPS, BVFR
322BC (327BC)
322B1 (327B1)
Depart 33L: 1 thru 9
33L
Arrive 33L: 2, 3, 5 thru 9
32
CIR, CAT1 (400 - 0.75)
Arrive 32: 1, 4, (3 & 6)
323BV (328BV)
323BB (328BB)
Depart 33L: 1 thru 9
33R
Arrive 33R: 1
33L
Arrive 33L: 2, 3, 5 thru 9
32
Arrive 32: 1, 4, (3 & 6)
VAPS, BVFR
324DV-D/W (329DV-D/W)
324DB-D/W (329DB-D/W)
Depart 33L: 3, 6, & 8
Depart 4L: 1, 2, 3, 5, 7, & 9
Arr. Hold Short 6,750' SOIR Group 4 (Group 3/No Jets when Wet)
4L
33L
Arrive 33L: 2, 3, 5 thru 9
32
Arrive 32: 1, 4, (3 & 6)
VAPS, BVFR
325DV (3210DV)
325DB (3210DB)
Depart 4L: 1 & 3
Depart 4R: 2 & 4 thru 9
4L
4R
33L
Arrive 33L: 2, 3, 5 thru 9
32
Arrive 32: 1, 4, (3 & 6)
VAPS, BVFR
Runway 32 Direction
Arrival and Departures
Departures Only
Arrivals Only
VAPS: ceiling >= 2,500; visibility >= 5
BVFR: ceiling <2,500>= 1,000; visibility <5>= 3
CRDA: ceiling <1,000>= 800; visibility <3>= 2
CIR: ceiling <1,000>= 600; visibility <3>= 1.5
CAT1: ceiling <600>= 400; visibility <1.5>= 0.75
Ceiling heights in feet Above Ground Level (AGL), Visibility in statute miles, Runway Visual Range (RVR) in feet

Runway Configurations (Cont.)

3211BV (3212BV)
3211BB (3212BB)

Depart 33L: 1,2
& 3 via G, 4 thru 9 full



VAPS, BVFR

Runway 32 Direction (cont.)

Arrival and Departures

Departures Only

Arrivals Only

VAPS: ceiling >= 2,500; visibility >= 5

BVFR: ceiling <2,500>= 1,000; visibility <5>= 3

CRDA: ceiling <1,000>= 800; visibility <3>= 2

CIR: ceiling <1,000>= 600; visibility <3>= 1.5

CAT1: ceiling <600>= 400; visibility <1.5>= 0.75

Ceiling heights in feet Above Ground Level (AGL),
Visibility in statute miles, Runway Visual Range
(RVR) in feet

Runway Configurations (Cont.)

Table D-5

DELAYSIM Results for Airside FEIS
Summary of 29M RJ Fleet Analysis

Case Name		PRAS Goal	1999 Actual	29M RJ Fleet, 97-99 Weather	
				Alt 4	Alt 1A
Pct of Equivalent Arrival Operations	Rwy 4	21.1%	30.6%	36.9%	27.5%
	Rwy 9	0.0%	0.0%	0.1%	0.2%
	Rwy 14	N/A	0.0%	0.0%	0.0%
	Rwy 15	8.4%	2.2%	1.5%	4.0%
	Rwy 22	6.5%	15.1%	21.1%	19.5%
	Rwy 27	21.7%	22.5%	9.0%	11.5%
	Rwy 32	N/A	0.0%	0.0%	5.4%
	Rwy 33	42.3%	29.6%	31.4%	32.0%
Pct of Equivalent Departure Operations	Rwy 4	5.6%	6.3%	6.2%	7.5%
	Rwy 9	13.3%	25.5%	32.5%	23.9%
	Rwy 14	N/A	0.0%	0.0%	0.2%
	Rwy 15	23.3%	11.5%	9.5%	12.0%
	Rwy 22	28.0%	33.9%	30.1%	24.5%
	Rwy 27	17.9%	17.0%	14.0%	19.4%
	Rwy 32	N/A	0.0%	0.0%	0.0%
	Rwy 33	11.9%	5.8%	7.8%	12.5%
Abs. Dev from PRAS Goals			75.4	104.7	68.1
PRAS Performance Index			726.0	1,387.9	609.1
Pct of Jet Arrival Operations	Rwy 4		39.8%	49.1%	28.5%
	Rwy 9		0.0%	0.1%	0.2%
	Rwy 14		0.0%	0.0%	0.0%
	Rwy 15		2.0%	0.8%	4.3%
	Rwy 22		9.7%	17.2%	11.0%
	Rwy 27		27.7%	17.5%	14.6%
	Rwy 32		0.0%	0.0%	8.6%
	Rwy 33		20.7%	15.4%	32.8%
Pct of Jet Departure Operations	Rwy 4		8.1%	9.5%	6.4%
	Rwy 9		31.4%	40.0%	24.8%
	Rwy 14		0.0%	0.0%	0.1%
	Rwy 15		5.1%	3.2%	4.8%
	Rwy 22		34.9%	34.6%	19.8%
	Rwy 27		15.0%	8.7%	29.9%
	Rwy 32		0.0%	0.0%	0.0%
	Rwy 33		5.5%	4.0%	14.1%
Annual Operations				529,276	529,276
Annual Hours of Delay				203,947	149,505
	VFR			81,912	37,810
	IFR			122,036	111,695
Avg Delay per Op (mins)				23.1	16.9
Avg Delay per Op with Cancellations (mins)				17.1	12.4
Pct Change in Total Delay vs. Baseline					26.7%

Definitions of Alternatives

1A) Operational Improvements, Taxiway Improvements, 5000' Runway 14/32

4) Baseline

Table D-6

Adjusted Capacities for 29M Low and 37.5M High Fleets

Tables 1 and 2 compare the original capacities with adjusted capacities for all runway configurations utilizing Runway 14/32 for the 29M Low and 37.5M High Fleets, respectively. The adjusted capacities reflect assumptions regarding regional jet utilization of Runway 14/32 based on the FAA's independent review.

Table 1. 29M Passenger Low Operations Fleet

Configuration ID	Weather Conditions	Arrival Runways	Departure Runways	Original Capacity	Adjusted Capacity
326BV	VAPS	33L/32	33L/27	123	121
326BB	BVFR	33L/32	33L/27	122	119
327BC	CIR	33L/32	33L	67	61
327B1	CAT1	33L/32	33L	64	58
328BV	VAPS	33L/33R/32	33L	81	65
328BB	BVFR	33L/33R/32	33L	80	63
329DV	VAPS	33L/32	33L/4L	83	72
329DB	BVFR	33L/32	33L/4L	83	72
3210DV	VAPS	33L/32	4L/4R	103	95
3210DB	BVFR	33L/32	4L/4R	103	94
3212BV	VAPS	27/32	33L	108	99
3212BB	BVFR	27/32	33L	107	99
146BV	VAPS, Dry	15L/15R/9	15R/9/14	116	101
146BV	VAPS, Wet	15L/15R/9	15R/9/14	88	75
147BB	VAPS, Dry	15R/9	15R/9/14	110	99
147BB	VAPS, Wet	15R/9	15R/9/14	86	74
148BC	CIRC	15R	15R/9/14	66	64
148B1	CAT1	15R	15R/9/14	65	65
149BV	VAPS	15L/15R	15R/14	56	54
1410BB	BVFR	15R	15R/14	52	50
1410BC	CIRC	15R	15R/14	50	50
1410B1	CAT1	15R	15R/14	50	49

Table 2. 37.5M Passenger High Operations Fleet					
Configuration ID	Weather Conditions	Arrival Runways	Departure Runways	Original Capacity	Adjusted Capacity
326BV	VAPS	33L/32	33L/27	117	115
326BB	BVFR	33L/32	33L/27	116	113
327BC	CIR	33L/32	33L	65	59
327B1	CAT1	33L/32	33L	60	56
328BV	VAPS	33L/33R/32	33L	74	62
328BB	BVFR	33L/33R/32	33L	74	63
329DV	VAPS	33L/32	33L/4L	77	68
329DB	BVFR	33L/32	33L/4L	77	68
3210DV	VAPS	33L/32	4L/4R	99	89
3210DB	BVFR	33L/32	4L/4R	99	89
3212BV	VAPS	27/32	33L	101	94
3212BB	BVFR	27/32	33L	101	92
146BV	VAPS, Dry	15L/15R/9	15R/9/14	109	98
146BV	VAPS, Wet	15L/15R/9	15R/9/14	86	74
147BB	VAPS, Dry	15R/9	15R/9/14	106	95
147BB	VAPS, Wet	15R/9	15R/9/14	86	75
148BC	CIRC	15R	15R/9/14	64	64
148B1	CAT1	15R	15R/9/14	64	63
149BV	VAPS	15L/15R	15R/14	52	52
1410BB	BVFR	15R	15R/14	50	49
1410BC	CIRC	15R	15R/14	50	49
1410B1	CAT1	15R	15R/14	50	49

Table D-7
DELAYSIM Results for Airside FEIS
Summary of 29M Low Wind Restriction Analysis

Case Name		PRAS Goal	2000 Actual	29M Low Fleet, 81-90 Weather, Airside Capacities							
				Alt 4	Alt 1A Unrestricted	Alt 1A with NW Wind Restriction					NW/SE Restriction
						5 kts	10 kts	15 kts	20 kts	25 kts	10 kts
Pct of Equivalent Arrival Operations	Rwy 4	21.1%	38.8%	34.8%	24.6%	26.9%	27.8%	29.2%	29.5%	29.7%	30.4%
	Rwy 9	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
	Rwy 14	N/A	N/A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Rwy 15	8.4%	1.0%	4.9%	7.7%	9.3%	9.7%	10.4%	10.4%	10.4%	6.8%
	Rwy 22	6.5%	10.5%	12.4%	12.3%	12.7%	12.7%	12.2%	12.1%	12.1%	12.8%
	Rwy 27	21.7%	24.4%	14.6%	18.6%	16.6%	15.8%	14.7%	14.5%	14.5%	15.8%
	Rwy 32	N/A	N/A	0.0%	6.8%	3.7%	2.9%	1.1%	0.3%	0.1%	2.9%
	Rwy 33	42.3%	25.2%	33.2%	30.0%	30.8%	31.0%	32.4%	33.2%	33.1%	31.4%
Pct of Equivalent Departure Operations	Rwy 4	5.6%	6.8%	7.7%	7.8%	7.3%	7.3%	7.0%	6.8%	6.8%	7.0%
	Rwy 9	13.3%	30.7%	28.3%	18.4%	22.7%	23.8%	25.9%	26.7%	26.9%	24.3%
	Rwy 14	N/A	N/A	0.0%	1.9%	2.4%	2.6%	2.8%	2.8%	2.8%	0.9%
	Rwy 15	23.3%	7.3%	12.5%	16.1%	14.5%	13.9%	13.0%	12.5%	12.4%	14.7%
	Rwy 22	28.0%	32.6%	26.3%	27.0%	26.0%	25.7%	25.3%	25.4%	25.6%	25.9%
	Rwy 27	17.9%	17.0%	14.1%	16.9%	15.7%	15.4%	14.8%	14.5%	14.3%	15.5%
	Rwy 32	N/A	N/A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Rwy 33	11.9%	5.6%	11.1%	12.0%	11.5%	11.3%	11.2%	11.3%	11.2%	11.7%
Abs. Dev from PRAS Goals			95.3	73.4	33.4	48.0	53.0	59.8	61.3	62.0	56.1
PRAS Performance Index			1,305.6	730.6	146.6	300.3	362.1	466.5	497.7	512.9	421.0
Pct of Jet Arrival Operations	Rwy 4		44.0%	44.0%	17.1%	24.3%	26.2%	30.9%	32.8%	33.3%	32.7%
	Rwy 9		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Rwy 14		N/A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Rwy 15		1.0%	4.2%	9.5%	14.3%	15.7%	17.0%	17.3%	17.3%	8.0%
	Rwy 22		7.0%	6.1%	4.5%	5.4%	5.6%	5.8%	5.9%	5.9%	5.8%
	Rwy 27		28.0%	29.2%	22.5%	25.3%	24.8%	25.9%	27.5%	27.8%	25.4%
	Rwy 32		N/A	0.0%	10.9%	5.8%	4.6%	1.9%	0.5%	0.1%	4.7%
	Rwy 33		20.0%	16.5%	35.4%	24.9%	23.1%	18.5%	16.0%	15.5%	23.4%
Pct of Jet Departure Operations	Rwy 4		8.0%	13.1%	10.9%	9.6%	9.7%	10.2%	10.5%	10.6%	10.9%
	Rwy 9		34.0%	32.6%	15.0%	23.4%	25.6%	29.6%	31.2%	31.5%	25.8%
	Rwy 14		N/A	0.0%	2.9%	4.2%	4.5%	5.0%	5.1%	5.1%	1.7%
	Rwy 15		4.0%	4.6%	6.5%	6.2%	6.1%	5.7%	5.5%	5.4%	5.9%
	Rwy 22		33.0%	35.0%	22.1%	27.9%	28.3%	30.9%	33.0%	33.4%	28.9%
	Rwy 27		15.0%	10.7%	28.1%	19.8%	18.2%	13.5%	10.6%	10.1%	18.7%
	Rwy 32		N/A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Rwy 33		6.0%	4.1%	14.5%	8.9%	7.6%	5.2%	4.2%	3.9%	8.1%
Pct of Nighttime Jet Arrival Operations	Rwy 4			27.2%	30.9%	29.1%	29.1%	27.8%	26.6%	26.6%	28.4%
	Rwy 9			0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
	Rwy 14			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Rwy 15			5.5%	6.1%	5.1%	4.8%	4.9%	4.7%	4.6%	5.7%
	Rwy 22			17.5%	18.8%	18.7%	18.6%	17.6%	17.3%	17.3%	18.6%
	Rwy 27			2.7%	15.4%	9.4%	8.4%	5.3%	3.7%	3.5%	7.8%
	Rwy 32			0.0%	3.3%	1.9%	1.4%	0.5%	0.2%	0.1%	1.4%
	Rwy 33			46.9%	25.4%	35.7%	37.6%	43.9%	47.4%	47.8%	38.0%
Pct of Nighttime Jet Departure Operations	Rwy 4			3.2%	5.2%	5.4%	5.3%	4.3%	3.7%	3.6%	3.8%
	Rwy 9			24.8%	21.2%	22.1%	22.4%	22.9%	22.9%	23.0%	23.1%
	Rwy 14			0.0%	1.0%	1.0%	1.0%	1.0%	0.9%	0.9%	0.2%
	Rwy 15			19.0%	24.3%	21.4%	20.5%	19.0%	18.4%	18.2%	22.0%
	Rwy 22			19.2%	31.1%	24.4%	23.6%	20.7%	19.2%	19.2%	23.3%
	Rwy 27			16.9%	7.3%	12.2%	13.0%	15.8%	17.7%	17.8%	12.8%
	Rwy 32			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Rwy 33			16.9%	9.9%	13.6%	14.3%	16.3%	17.2%	17.3%	14.8%
Annual Dwell Exceedence				5,220	6,271	6,488	6,340	5,765	5,617	5,595	6,019
Annual Persistence Exceedence				9,716	9,423	8,429	8,381	8,669	9,151	9,243	8,194
Annual Operations				510,276	510,276	510,276	510,276	510,276	510,276	510,276	510,276
Annual Hours of Delay				136,423	108,441	115,350	116,560	118,820	120,644	122,917	118,360
	VFR			32,786	17,169	22,224	22,846	24,697	26,282	28,209	23,923
	IFR			103,637	91,272	93,126	93,714	94,123	94,362	94,708	94,437
Avg Delay per Op (mins)				16.0	12.8	13.6	13.7	14.0	14.2	14.5	13.9
Avg Delay per Op with Cancellations (mins)				11.9	9.4	10.2	10.3	10.6	10.8	11.0	10.5
Pct Change in Average Delay vs. Baseline					20.5%	15.4%	14.6%	12.9%	11.6%	9.9%	13.2%

Table D-8
DELAYSIM Results for Airside FEIS
Summary of 37.5M High RJ Wind Restriction Analysis

				37.5M High RJ Fleet, 97-99 Weather with Gusts, Airside Capacities							
						Alt 1A with NW Wind Restriction					NW/SE Restriction
Case Name		PRAS Goal	2000 Actual	Alt 4	Alt 1A Unrestricted	5 kts	10 kts	15 kts	20 kts	25 kts	10 kts
Pct of Equivalent Arrival Operations	Rwy 4	21.1%	38.8%	43.6%	31.8%	36.0%	37.7%	38.7%	39.4%	40.6%	38.4%
	Rwy 9	0.0%	0.0%	0.1%	0.9%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
	Rwy 14	N/A	N/A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Rwy 15	8.4%	1.0%	0.6%	2.4%	3.0%	2.9%	2.6%	2.6%	2.6%	0.9%
	Rwy 22	6.5%	10.5%	26.7%	20.1%	23.5%	24.6%	26.1%	26.7%	27.5%	24.8%
	Rwy 27	21.7%	24.4%	11.9%	7.4%	8.7%	9.5%	11.1%	11.5%	11.8%	9.8%
	Rwy 32	N/A	N/A	0.0%	7.6%	4.8%	3.5%	1.9%	1.4%	0.6%	3.5%
	Rwy 33	42.3%	25.2%	17.1%	29.7%	23.8%	21.8%	19.5%	18.3%	16.9%	22.5%
Pct of Equivalent Departure Operations	Rwy 4	5.6%	6.8%	9.4%	8.2%	7.9%	8.2%	8.5%	8.6%	9.0%	8.2%
	Rwy 9	13.3%	30.7%	36.6%	28.4%	32.0%	33.1%	33.7%	34.4%	35.1%	32.9%
	Rwy 14	N/A	N/A	0.0%	0.1%	0.4%	0.4%	0.3%	0.3%	0.3%	0.1%
	Rwy 15	23.3%	7.3%	6.3%	8.6%	7.7%	7.6%	7.4%	7.3%	7.0%	7.1%
	Rwy 22	28.0%	32.6%	38.0%	22.9%	30.4%	32.6%	36.2%	37.5%	38.8%	33.1%
	Rwy 27	17.9%	17.0%	7.0%	21.6%	14.3%	12.2%	9.8%	8.3%	6.8%	12.6%
	Rwy 32	N/A	N/A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Rwy 33	11.9%	5.6%	2.7%	10.2%	7.4%	6.0%	4.1%	3.7%	3.0%	6.2%
Abs. Dev from PRAS Goals			95.3	159.8	93.4	110.8	123.5	137.5	144.1	153.1	125.9
PRAS Performance Index			1,305.6	2,852.9	1,058.0	1,522.3	1,795.4	2,138.8	2,337.7	2,631.0	1,836.1
Pct of Jet Arrival Operations	Rwy 4		44.0%	52.7%	38.7%	45.7%	47.9%	49.2%	49.9%	51.1%	48.4%
	Rwy 9		0.0%	0.1%	1.3%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
	Rwy 14		N/A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Rwy 15		1.0%	0.6%	2.9%	2.2%	2.2%	2.1%	2.1%	2.1%	0.8%
	Rwy 22		7.0%	20.3%	9.7%	14.5%	15.5%	17.8%	18.9%	20.1%	15.8%
	Rwy 27		28.0%	16.7%	7.7%	11.3%	12.1%	14.5%	15.6%	16.4%	12.3%
	Rwy 32		N/A	0.0%	10.2%	6.3%	4.9%	2.9%	2.0%	0.8%	4.9%
	Rwy 33		20.0%	9.7%	29.5%	19.9%	17.3%	13.5%	11.4%	9.5%	17.7%
Pct of Jet Departure Operations	Rwy 4		8.0%	11.6%	8.9%	9.8%	10.2%	10.6%	10.8%	11.3%	10.3%
	Rwy 9		34.0%	41.9%	32.9%	37.6%	39.3%	40.2%	40.7%	41.3%	39.1%
	Rwy 14		N/A	0.0%	0.1%	0.3%	0.3%	0.3%	0.3%	0.3%	0.1%
	Rwy 15		4.0%	2.3%	3.9%	2.9%	2.9%	2.8%	2.8%	2.7%	2.5%
	Rwy 22		33.0%	36.5%	14.1%	24.4%	26.5%	31.5%	33.9%	36.1%	26.9%
	Rwy 27		15.0%	5.8%	29.2%	18.1%	15.2%	10.9%	8.5%	6.0%	15.4%
	Rwy 32		N/A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Rwy 33		6.0%	2.0%	10.8%	6.9%	5.6%	3.8%	3.1%	2.3%	5.7%
Pct of Nighttime Jet Arrival Operations	Rwy 4			38.7%	27.8%	30.4%	31.7%	32.6%	33.4%	34.8%	32.7%
	Rwy 9			0.1%	0.7%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
	Rwy 14			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Rwy 15			0.7%	2.1%	3.4%	3.3%	3.0%	3.0%	2.9%	1.0%
	Rwy 22			30.1%	26.3%	28.7%	29.8%	30.9%	31.0%	31.6%	30.0%
	Rwy 27			9.4%	7.3%	7.3%	8.0%	9.1%	9.2%	9.3%	8.4%
	Rwy 32			0.0%	6.0%	4.0%	2.6%	1.4%	1.1%	0.5%	2.6%
	Rwy 33			21.1%	29.8%	26.1%	24.4%	22.9%	22.2%	20.9%	25.2%
Pct of Nighttime Jet Departure Operations	Rwy 4			8.0%	7.7%	6.4%	6.7%	6.9%	7.0%	7.4%	6.7%
	Rwy 9			33.1%	25.0%	27.8%	28.5%	29.0%	29.8%	30.8%	28.3%
	Rwy 14			0.0%	0.1%	0.4%	0.4%	0.4%	0.3%	0.3%	0.1%
	Rwy 15			8.9%	12.2%	11.2%	11.0%	10.7%	10.5%	9.9%	10.5%
	Rwy 22			39.1%	29.6%	34.9%	37.2%	39.7%	40.0%	40.7%	37.6%
	Rwy 27			7.7%	15.7%	11.5%	10.0%	8.9%	8.2%	7.4%	10.4%
	Rwy 32			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Rwy 33			3.2%	9.7%	7.7%	6.2%	4.4%	4.1%	3.5%	6.5%
Annual Dwell Exceedence				7,022	4,923	6,170	6,395	6,574	6,760	6,963	6,416
Annual Persistence Exceedence				12,390	7,157	9,274	9,979	10,974	11,608	12,271	9,992
Annual Operations				584,722	584,722	584,722	584,722	584,722	584,722	584,722	584,722
Annual Hours of Delay				372,220	263,489	280,949	283,050	288,102	292,879	320,660	283,262
	VFR			192,882	97,554	111,616	113,181	117,987	122,695	149,936	113,205
	IFR			179,338	165,935	169,333	169,869	170,115	170,183	170,724	170,056
Avg Delay per Op (mins)				38.2	27.0	28.8	29.0	29.6	30.1	32.9	29.1
Avg Delay per Op with Cancellations (mins)				28.6	20.0	21.5	21.7	22.2	22.6	25.1	21.7
Pct Change in Average Delay vs. Baseline					29.2%	24.5%	24.0%	22.6%	21.3%	13.9%	23.9%